Nature Magazine

VOLUME 45 NUMBER 7

AUGUST-SEPTEMBER, 1952

CONTENTS

Pep Up Your Meetings

Motion pictures of Nature and the Outdoors will take you far and wide in the world of the wild

16 millimeter, silent, black and white films requiring 16 minutes each to project.

Schools; Garden Clubs; Women's Clubs; Nature and Hiking Clubs; Boy and Girl Scout Troops; Church, Civic and Fraternal Organizations; Sportsmen and Conservation Groups will be interested in these motion picture films. Thrilling, educational motion pictures help to boost attendance at meetings. They make meetings more interesting and help to promote some educational activities by increasing a knowledge of Nature and the outdoors; developing a consciousness of the need for practical conservation of our national resources and the protection of wildlife.

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For forty years William L. Finley has been shooting wildlife. But everything he has shot still lives, for it was shot with a motion picture camera. More than two hundred thousand feet of film now carry the record of his camera hunting.

The American Nature Association commissioned Dr. Finley to edit eighteen 400-foot reels of 16 millimeter motion picture film, drawing upon the best of his material. Then 200,000 feet of 35 millimeter film are condensed into the equivalent of 18,000 feet of the best shots of all.

These interesting, entertaining and educational films are grouped as follows:

GROUP I: Specially adapted for school use and for juvenile audiences.

11. *Homes in the Woods:* The life of Nature's young in the wild.
12. *Wild Animal Pets:* A naturalist's dog into whose life came many strange animals.
13. *Nesting Heroes for Songs:* An intimate study of bird life.

GROUP II: A spectacular series of Alaskan reels.

21. *Cruising North:* Murres, sea puffins, bear and other coastal wildlife.
22. *Off to Glacier Bay:* Spectacular pictures of the face of a glacier breaking off and plunging into the bay. Also wildlife scenes.
23. *Wild Animal Outposts:* Hardy Island deer, ptarmigan, bear cubs, blue fox, fur seals of the Pribilofs.
24. *Thar She Blows!* Whales at sea.
25. *Great Bear of Alaska:* Films of the great Kodiak bears of Admiralty Island.

GROUP III: Southwestern series.

31. *Wings to the South:* Bird life of the Texas Gulf Coast and the southwest.
32. *Riding the Rimrock:* Searching the rough country of the southwest for its wildlife.
33. *Nature's Side Show:* The struggle for existence in the arid southwest.
34. *Queer Creatures of the Cactus Country:* A study in the adaptation of wildlife to a harsh land.
35. *Getting Personal with Mountain Lions:* A thrilling picture of a pack trip into lion country.

GROUP IV: Photographed along the Continental Divide.

41. *The Big Game Parade:* You meet Antelope, Mountain Sheep, Mule Deer, Elk, Bison, Moose, Brown Bears and Grizzlies.
42. *The Forests:* Forest Fires, Birds, Beaver — greatest conservationist of all — at work.
43. *Where Mountains Call:* The life of the high places is thrilling to see. Water Ouzel, Ptarmigan, American Eagle, Big Horn Sheep, Wapiti — American cousin of the European Stag.
44. *Jumparoo of the North:* Filming big game requires endurance. Glaciers, Hoary Marmot, Caribou, Moose, Black Bear.
45. *Getting Our Goat:* Mountain Goat on its native crags. Ground Squirrels, Coney, Grouse.

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Study of Fall Migration

The Louisiana State University Museum of Zoology has announced plans for a second cooperative investigation of the nocturnal migration of birds, to be staged this autumn. Observers all over the country are being asked to help obtain telescopic counts of migrants passing before the disc of the moon. By the use of this method, which yielded surprising results in a similar study in the spring of 1948, it will be possible to map the volume and flow of fall migration in different localities and to obtain answers to many puzzling questions. The observation procedure is a simple one. Anyone who has access to a small telescope, or to a large one, can participate. Interested persons are urged to write at once to Robert J. Newman at the Museum of Zoology, Louisiana State University, Baton Rouge, Louisiana.

Bird Baby-Sitters

How certain kinds of birds appoint baby-sitters from the older members of their flocks (grandmothers, presumably) so the parents of the young may go gallivanting on other activities is told by Dr. Austin L. Rand, curator of birds at Chicago Natural History Museum. Writing in the Bulletin, monthly periodical of the institution, Dr. Rand tells also about co-operative nursery-nests in which 20 or more young birds of different parents are cared for much as human children of working mothers are in day-nurseries.

One of the most elaborate systems for caring for the young has been evolved by the Adelie penguins which nest in various islands and other land areas of the Antarctic. "These birds make their nests in scoops in the soil, lining them with stones, and there they lay and incubate their two eggs per hen. The sexes alternate in their care of the eggs and of the young in their early stages. But when the young are partly grown the family unit breaks up for a communistic type of social organization. The young are then grouped into bands of 20 or more and are left under the care of a few old birds while the rest of the adults go to the water, which may be some distance away. Periodically they return with food for the young. Apparently an individual 'child' is not recognized by the parent, but the parent goes to the particular group of which its young make a part and there may feed any one of the 'child group.'"

The anis — moderate-sized cuckoos that live in the American tropics — go in flocks the year round, Dr. Rand says, and among them it is customary to find a number of birds nesting together. "Usually there are about seven birds in the flock, but there may be as many as 24. The nest is a bulky structure of twigs and fresh leaves. When nest building starts, one bird is usually most active, but as many as five birds have been seen carrying sticks at one time. When the nest of sticks and leaves is finished, several females may lay their eggs in it. But apparently only one bird incubates at a time, and the male takes his turn at incubating. When the young hatch, after about 13 days, most of the adults in the colony help feed the young.

"Eider ducks (inhabitants of the Arctic regions) may nest in dense colonies, but each bird has its own nest in which it lays its own eggs and in which the female alone incubates. After the young hatch and the mother leads them to the water, the young may band into larger flocks, accompanied by a number of females, though each duckling seems to be independent of its particular parent and attaches itself to and is tended by the nearest duck."

In New Guinea

Somewhere in New Guinea. By Frank Clune. New York. 1952. Philosophical Library. 356 pages. Illustrations by Syd Miller. $4.50.

In 1940 the author of this fascinating book first went to New Guinea and for a long time his address was the same as his selection of a title for his book. On this trip he gathered material on the gold boom in New Guinea, on the people, on the flora and fauna and the whole land of mystery. Not long after this visit men wearing the uniforms of the armed services of the United States came to New Guinea to oust the Japanese and to found bases from which to prosecute a war to the northward. After the conflict Frank Clune revisited the great sub-continent twice more in quest of additional facts. Thus this book has been a decade in the making, and it may well be that it is better for that fact. In any event, it is a book much worth reading, and we have no doubt that it will have nostalgic interest for many Americans who fought there.

Six Western Trees

Trees of the West. By Elizabeth Chapman Willier. New York. 1952. Pageant Press. 29 pages. Illustrated by Barry Martin. $1.50.

The title of this little book is rather more inclusive than its contents, since it is actually an appreciation of six outstanding tree species in the West. These are the two species of sequoias, the myrtle, the Carmel and Monterey cypress, the Joshua (for some reason spelled Joshue) tree and the Torrey pine.

Camping

Camping for All It's Worth. By William E. Swanson. New York. 1952. The Macmillan Company. 154 pages. Illustrated. $2.95.

This book is directed to the amateur camper who is interested in Nature but has a limited income with which to enjoy an outdoor experience. The text is simple and practical and aided by illustrations that are equally understandable. It is a handy sized book, too, and can easily be taken along on any camping trip as a part of equipment.

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Nature in Print

By HOWARD ZAHNISER

ONE of the greatest enjoyments derived from a thoroughly good book is realized in the rereading of other good books that it calls to mind. We are accustomed to thinking of the reference value of a book as depending on the benefit we get by referring to it, but surely there also are reference values in a volume's sending us to other works. Nor is this necessarily accomplished by a bibliography or a reference list, but also by a stimulus of thought and interest so intense as to motivate the reader's own search. Thus, incidentally, one keeps vital the past of one's reading and conserves the contributions of the earlier writers he has known. Joseph Wood Krutch's *The Desert Year* is an excellent and most recent example. Discussed on this page for June-July, in an article with so many quotations that it might have been subtitled "An Interview with a Book," it so keenly aroused interest in its subject matter as to send its reader not only to other discussions of the importance of Nature, but particularly to other books on the desert. Of these, before Mr. Krutch's account of his recent experiences and contemplations, there were two volumes that had come to stand for the desert on these particular shelves, and both of them on the rereading stimulated by *The Desert Year* have been more deeply enjoyed and more highly appreciated than before.

One of these works is John C. Van Dyke's *The Desert*, first published in the first year of this century (1901, if there is question), and the other, of course, is Mary Austin's almost as old, 1903 volume, *The Land of Little Rain*.

There is a great marvel in John C. Van Dyke's ability to sense the qualities of a landscape, and a marvel equally as great in his interpretive skill in communicating in writing his keen perceptions. The desert "is stern, harsh, and repellent," Professor Van Dyke realized. "But," he exclaimed, "what tongue shall tell the majesty of it, the eternal strength of it, the poetry of its wide-spread chaos, the sublimity of its lonely desolation! And who shall paint the splendor of its light; and from the rising up of the sun to the going down of the moon over the iron mountains, the glory of its wondrous coloring!" In his preface Professor Van Dyke observed that the desert had "gone a-begging for a word of praise these many years," and he served well to correct the neglect. He called the deserts "the breathing-places of the west" and declared that they "should be preserved forever." In fact, so profoundly did he resist the destruction of deserts that he questioned the very existence of "the destroyers." In a question so exclamatory as to call for an exclamation point rather than a question mark he demanded: "What monstrous folly, think you, ever led Nature to create her one great enemy — man!" "The aesthetic sense — the power to enjoy through the eye, the ear, and the imagination —" he maintained, "is just as important a factor in the scheme of human happiness as the corporeal sense of eating and drinking," and he most eloquently revealed the desert's ministry to this sense. One can indeed be thankful to Joseph Wood Krutch, and his own *The Desert Year*, for a stimulus to a reading of John C. VanDyke's *The Desert*.

And there is a double joy ("joy" is the word) in *The Desert Year*'s reference to *The Land of Little Rain* — although, like Professor Van Dyke's volume, it happens to be unmentioned; for the new attention to Mary Austin's classic has brought to hand an unnoticed (or inadequately noticed) revival in a beautiful edition with forty-eight photographs by Ansel Adams. The peculiar magnificence and the understanding intimacy of these photographs that Ansel Adams has created with his art, his devotion to Mary Austin's masterpiece, and his own experience in the desert lands are contributions to an understanding both of the book and of the land. The drawings, particularly the marginal sketches, with which E. Boyd Smith illustrated the first (1903) edition of Miss Austin's work are charming, and in harmony with the deftness of Mary Austin's touch. But there is nothing like a series of Ansel Adams photographs to provide in a book a visual experience of a landscape and the distinctions that comprise its own individuality. A few years ago Houghton Mifflin Company published an assembly of Charlotte Mauk's selections from John Muir's writings entitled *Yosemite and the Sierra Nevada* and a series of Ansel Adams photographs with the part of the text to which each refers printed as a quotation on its facing page, an excellent publication, and this edition of *The Land of Little Rain* is like it. The text, the photographs, and the book that combines them — each is an achievement to please a reader.

"This is the sense of the desert hills, that there is room enough and time enough," says the quotation from *The Land of Little Rain* that faces the first of these photographs, entitled "The White Mountain Range and Upper Owens Valley from the Buttermilk Country." Broken plow handles and a pile of rocks in a level waste (called "Ruins Near Keeler") are in the photograph for the simple Mary Austin statement, "Here you have no rain when all the earth cries for it." "You will find it forsaken of most things but beauty and madness and death and God," says the sentence facing a photograph, "Grave Near Rhyolite, Nevada," which shows a burial place with severely simple markers protected by a fence of bare four-by-four's. A photograph named "Clearing Thunderstorm, Sierra Nevada," showing majestic cumulus clouds fringed and magically lightened by the sun which they hide, and almost, it seems, dwarfing the mighty snowy mountains below — this surely gives vivid meaning to Mary Austin's assurance: "There will be cloud pillars miles high, snow-capped, glorified, and preserving an orderly perspective before the unbarred door of the sun. . ." And the four-dozen series ends with a photograph of a full moon high above picturesque, quiet, bare mountains — "Evening, Northern Ranges of Death Valley" — and these words of Mary Austin's for contemplation: "For all the toll the desert takes of a man it gives compensations, deep breaths, deep sleep, and the communion of the stars."

Mary Austin knew her land of little rain, admired it boldly, and regarded it intimately. "The real heart and core of the country," as Joseph Wood Krutch a generation later also realized, "are not to be come at in a month's vacation," she warned her readers who might seek for themselves what she revealed in her book. "One must summer and winter with the land and wait its occasions." Yet she sensed the desert's deepening meaning for those seeking the renewals that vacations ought to bring. As she experienced there, "the divinest, cleanest air to be breathed anywhere in God's world," she predicted that "some day the world will understand that, and the little oases on the windy tops of hills will harbor for healing its ailing, house-weary broods." She advised that "for seeing and understanding, the best time is when you have the long-

Response

By HELEN HAMANN GEIGER

Now trembles bursting bud
Upon the heath,
And in the opaled sky of spring
Wild geese fly
To their fulfilment.
Under the crisp of last year's leaf
Wood things stir and rise and fling
Long-bated joy, nor spare
In scampering the lair
Of Beauty, hid beneath.

Now sing brittle grasses
By the sand dunes,
And on the blue-washed beaches
Comic pipers dance
In swifter pace.
Under the spell of sea and summer moons,
Gold of grain and purple mountain reaches,
Threnody of bird and bee —
Shall we alone unsinging be
Of Nature's tunes?

est leave to stay." She perceived that "the rawness of the land favors the sense of personal relation to the supernatural." Along the mesa trails ("meant to be traveled on horseback" because "a foot-pace carries one too slowly past the units in a decorative scheme that is on a scale with the country") she found that "treeless spaces uncramp the soul." When she looked up what she called "The Streets of the Mountains," as she says in her essay with that title, the mountains brought her intimations of some aspects of the deepest realities. "When those glossy domes swim into the alpenglow, wet after rain, you conceive," she testified, "how long and imperturbable are the purposes of God." "It is astonishing," she remarked, "the trouble men will be at to find out when to plant potatoes, and gloze over the eternal meaning of the skies." There is no glozing over in *The Land of Little Rain*. Written surely after much contemplation, it is read thoughtfully and, although brief, it is read long — and reread. When the new edition with Ansel Adams's photographs came to my hand and Alice held the first edition and we read aloud by turns, the whole of it brought again a new and revealing experience and the fourteen passages marked for quotation had added to them eight more.

Mary Austin's reverent understanding of the country was accompanied by a humble and respectful sympathy for its wild inhabitants and also for its human occupants. Her accounts of the Indians are, by themselves, enough to make her book worth preserving; "there are things," she assured us, "to be learned of life not set down in any books — folk tales, famine tales, love and long-suffering and desire, but no whimpering," and she communicates to us a sense of even the unexpressed perceptions. Not only for the Indians, but also for the prospectors and the pioneers and even for the visitors, she has a regard. Perhaps indeed, the most poignant of all Mary Austin's many depth stirring portrayals in *The Land of Little Rain* is in her so quiet but effective retelling of the account of a prospector who, lost in a snowstorm, finally settled down to sleep in safety in the midst of a flock of wild sheep.

"He said that if he thought at all at this juncture he must have thought that he had stumbled on a storm-belated shepherd with his silly sheep; but in fact he took no note of anything but the warmth of packed fleeces, and snuggled in between them dead with sleep. If the flock stirred in the night he stirred drowsily to keep close and let the storm go by. That was all until morning woke him shining on a white world. Then the very soul of him shook to see the wild sheep of God stand up about him, nodding their great horns beneath the cedar roof, looking out on the wonder of snow."

The Land of Little Rain. By Mary Austin. Boston: Houghton Mifflin Company. 1950. 135 pp. (8¼ by 10¼ in.) with an introduction by Carl Van Doren, 48 full-page photographs by Ansel Adams faced by quotations from the text, "A Note on the Land and on the Photographs" by Ansel Adams, an annotated glossary of "Regional Place Names," photographic data on each of the 48 photographs, "A Short List of Books", and "stylized" end-paper map by Milton Cavagnaro. $6.

Platt on Trees

American Trees. By Rutherford Platt. New York. 1952. Dodd, Mead and Company. Illustrated with photographs in color and black and white by the author, and more than 200 drawings by Margaret L. Cosgrove. 256 pages. $3.50.

The author gives a subtitle to this book, calling it "A Book of Discovery," doing so because he has brought into his interesting and informative text many surprising things about trees. And the book differs from most other tree books in that it covers trees from all parts of the United States. Most tree books, especially those used in identification, are either regional or deal with trees of the West or the East. The author also includes some immigrant trees that have become an important part of our tree population. It is both a book for identification and appreciative knowledge of trees, and one for pleasurable reading.

Derleth's Poems

Rendezvous in A Landscape. By August Derleth. New York. 1952. The Fine Editions Press. 54 pages. $2.50.

This poet has appeared often in the pages of *Nature Magazine* because his poems reflect a deep understanding of and affection for Nature. They are sincere and simple and express the philosophy of one with a great respect for the landscape. Several of the poems that have appeared in our pages are included in this collection, which adds another attractive book to the growing number by this author and poet.

Civic Annual

American Planning and Civic Annual. Edited by Harlean James. Washington, D.C. 1951. American Planning and Civic Association. 150 pages. $3.00.

This is a record of recent civic advance in the fields of planning, parks, housing, neighborhood improvement and conservation of natural resources. It also includes addresses delivered at the National Citizens Conference on Planning and Resources and the meeting of the National Conference on State Parks.

Farming and Fisheries

Oxford Junior Encyclopedia, Volume VI, Farming and Fisheries. New York. 1952. Oxford University Press. 494 pages. Illustrated. $8.50.

This is the seventh of the published volumes of this twelve-volume junior encyclopedia, and the sixth numbered volume. Besides the subjects covered in the subtitle, the volume includes, forestry, fur-hunting and farming, and gardening.

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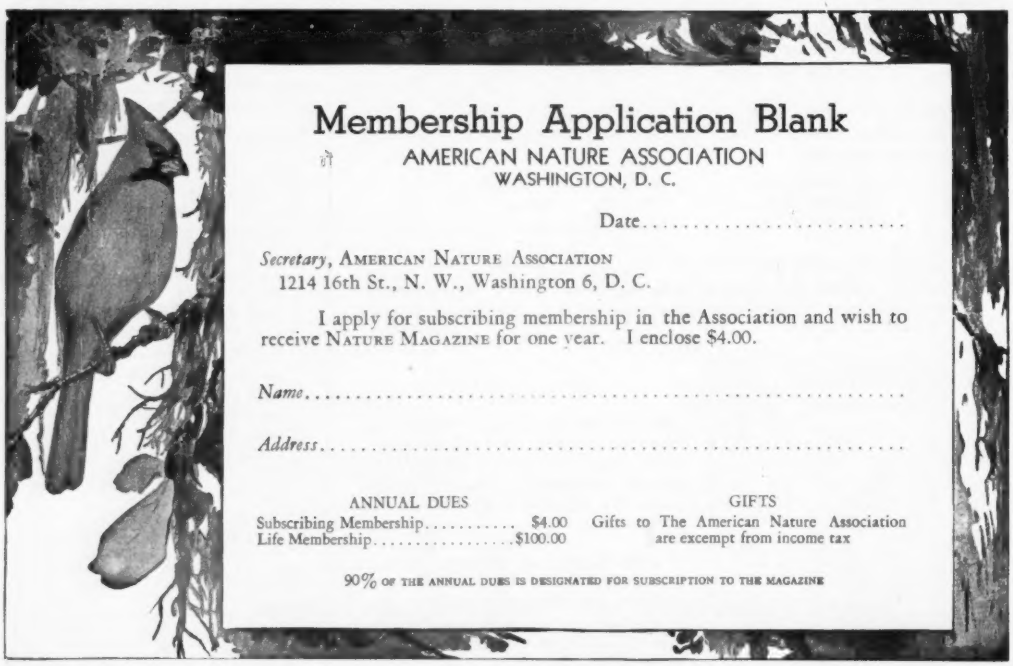
By Way of Report

In 1951 the American Nature Association made a grant of $10,000 to the National Association of Biology Teachers for a three-year conservation project. The two major objectives of this program are to encourage as many biology teachers as possible to engage in some conservation teaching, and to obtain descriptions of the outstanding techniques used in this teaching, with a plan to publish these in a series of leaflets on conservation teaching.

State committees of biology teachers have been organized in all States, with steering or advisory committees representative of the State teachers' organization, the State educational agency, the State conservation authority, and as many resource agencies as necessary. These advisory groups aid the committee of biology teachers in carrying out the general objectives of the program. The executive committee in charge of coordinating the project consists of Richard L. Weaver, president of the N.A.B.T.; E. Laurence Palmer, Ithaca, N.Y.; Lydia Elsey, State College, Pa.; Howard Michaud, West LaFayette, Inc.; Leo Hadsall, Fresno, Cal.; John Harrold, Midland, Mich.; George Jeffers, Farmville, Va.; Betty Lockwood Wheeler, Mt. Pleasant, Mich.

To further knowledge of the objectives and work of the International Union for the Protection of Nature, the American Nature Association in 1951 made a special grant of $5000 a year for two years. Under this grant the Commission on Public Information of IUPN was formed, and Richard W. Westwood, president of the American Nature Association was named by the Executive Board of IUPN to head this Commission. There has now been published, and made available on request, a concise folder entitled "What Is the International Union for the Protection of Nature?" The Commission has also brought out a newssheet containing releases on conservation activities from many parts of the world. This has been distributed widely to the press and magazines, and to individuals and publications in the conservation field.

For many years the American Nature Association has actively cooperated with the National Roadside Council, and has contributed annually to make possible its work in behalf of roadside improvement. This work has been under the leadership of the late Elizabeth B. Lawton, who was given a citation by *Holiday Magazine*. This reads: "For her courageous, ceaseless battle against the billboard and similar blights on the natural beauty of America's roadside." Owing to illness, Mrs. Lawton was unable to be present on June 23 to receive this citation, and it was received in her behalf by Albert S. Bard, counsel to the National Roadside Council, who has fought side by side with Mrs. Lawton through the years. The American Nature Association is gratified by this recognition of accomplishment, and is happy to have played a part in it.



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Contents Noted

THINGS are going to seem different around the offices of the Wildlife Management Institute in Washington — Ethel Quee is retiring. Thirty-seven years ago last May she joined the staff of the American Game Protective Association, became assistant secretary when the name was changed to the American Wildlife Institute, and secretary when the organization was renamed the Wildlife Management Institute. Quietly and efficiently she has attended to a multitude of details connected with the annual North American Wildlife Conferences sponsored by the Institute, has edited the annual *Transactions* and many of the permanent publications of the organization. One of the wildlife conferences will not seem the same without her. Ethel has an army of friends in the conservation field, and every member of that army wishes her well and a well-earned rest from the demanding duties she has so long performed. We want to be in on that as a soldier in that army.

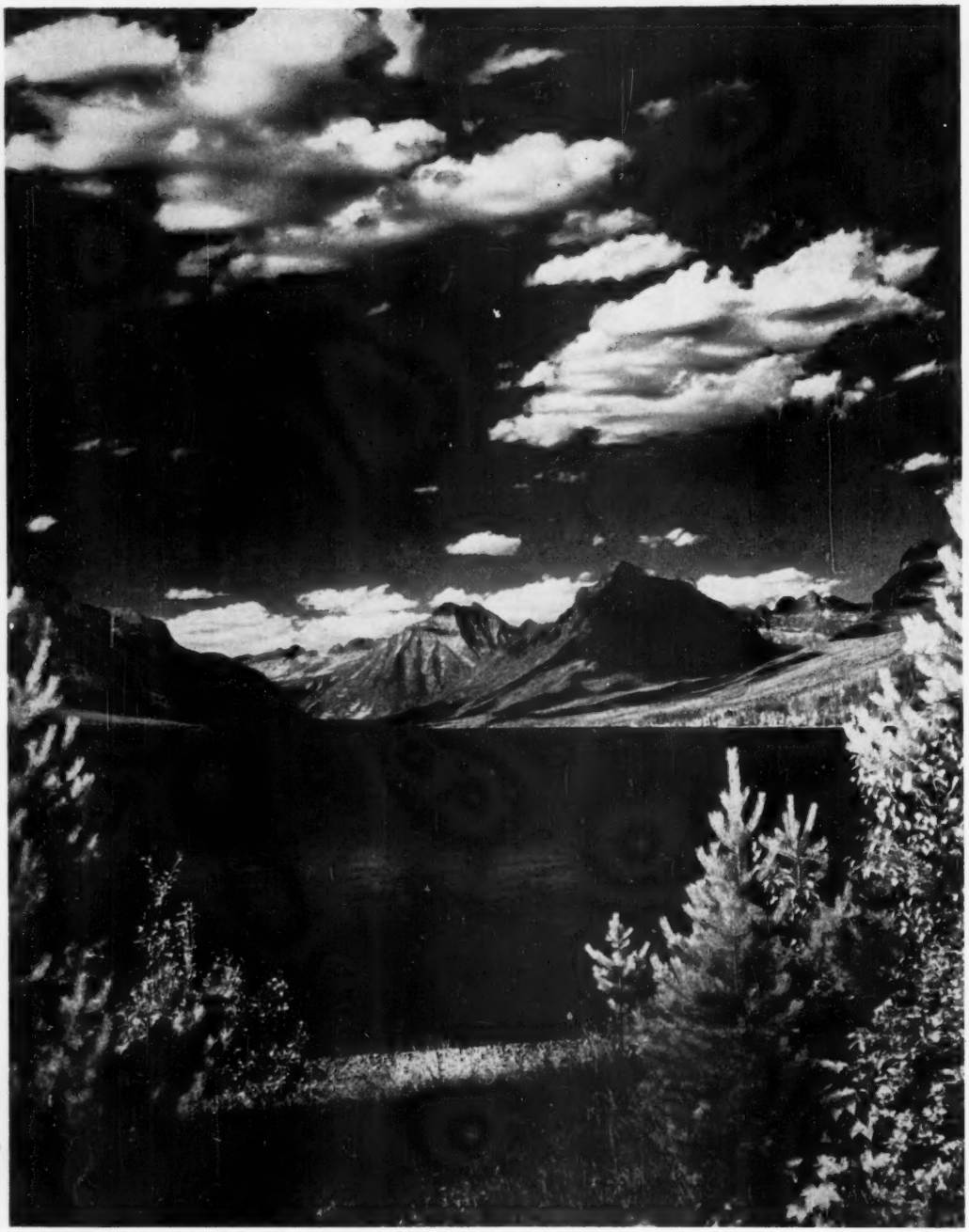
IN THE June-July issue of *Nature Magazine*, on this page, we commented on the then-pending legislation that would protect "Smokey Bear," who recently "made" the cover of *Newsweek*, from any illegal or ill-advised use. This bill has been passed by the Congress and signed by the President Now this symbol of forest protection cannot be used in any form without specific and carefully considered permission of the Department of Agriculture. His popularity had threatened to become his undoing, and various enterprising firms and individuals saw commercial possibilities in "Smokey." Many of these would have belittled his real purpose in life, which is to inspire people to protect our forests from the devastation of fire. We are happy to report that "Smokey" can now give his full attention to a very important task.

ANYONE interested in Nature, national parks and conservation should not fail to see "Ivory Hunter," recent motion picture release by Universal-International. Filmed in technicolor entirely in Africa, this picture is "tops" among wildlife pictures. The story is based on the life of H. Mervyn Cowie and his dogged fight for the creation of the national parks in Britain's East African colony of Kenya. The action moves around the difficult task of protecting the park area against illegal hunting and the commercial greed of ivory hunters. The human actors, both white and native, are excellent, but in many scenes the giraffes, zebras, lions, elephants, water buffalos, rhinos, and other wild residents in the park "steal" the show. The film has the "feel" of its locale and the authenticity that made two other African pictures — "King Solomon's Mines" and "African Queen" — such outstanding successes. This latest African picture should join these in public appreciation. It appears that the motion picture industry has finally realized that there is a large audience for pictures in which Nature plays a leading role. Recent successes of this sort should leave no doubt. We heartily commend "Ivory Hunter," which we were privileged to see in a preview and which we shall see again.

CLOSELY related to the motion picture, "Ivory Hunter," is a tip that we will pass on to Hollywood, completely without charge. An outstanding movie could be based upon the life of Stephen T. Mather, first director of the National Park Service. Such a film would have all the essential elements of struggle. It would be laid against the political background of Washington of the time. It would be a story of salesmanship. And a fair share of the picture could be filmed in color in our national parks. The personality of Steve Mather was so outstanding that, properly cast, and with a careful script, the actor getting this role would have a tremendous opportunity. If Hollywood is as short of ideas, as would seem to be the case, here is one.

IN A big bend of the Potomac River between Memorial and Key bridges in the National Capital lies Theodore Roosevelt Island. This island comprises ninety acres of unspoiled wilderness and was purchased at a cost of $364,000 by the Roosevelt Memorial Association and dedicated to the memory of the twenty-sixth President of the United States. It was accepted by Act of Congress in 1932, to be "maintained and administered . . .as a natural park for the recreation and enjoyment of the public: *Provided*, that no general plan for the development of the island shall be adopted without the approval of the Roosevelt Memorial Association; and that, so long as this association remains in existence, no development, inconsistent with this plan, be executed without the association's consent." Now the island is threatened, because Federal workers, pouring back and forth daily from homes in nearby Virginia, encounter traffic delays. The proposal has been advanced that another bridge be built, crossing a part of the island. This is, in our opinion, an unwarranted betrayal of trust, and should not be permitted under any circumstances.

WITH our national emblem, the American eagle, protected by law throughout the forty-eight States, it has always seemed a travesty that there should be a bounty on its head in the Territory of Alaska. There has been a two-dollar bounty since 1917, and it has been paid on the claws of more than 100,000 eagles since then. At long last this bounty is to an extent nullified by a regulation of the Department of the Interior providing for no open seasons on the bald eagle and stating: "These birds may be killed only when committing damage to fishes, other wildlife, domestic birds and animals. No carcass or any part thereof, including feathers of birds so taken, may be transported for any purpose." This does not mean that there will not be some shooting of eagles, but the profit motive is eliminated. It is hoped that the Territorial Legislature will now repeal the bounty law, and that we may look to full protection for our National Bird. R.W.W.



From mirrored shores of Lake MacDonald, Glacier National Park, mighty timberlands sweep up to the grandeur of eternal summits. In such vastnesses the celestial voice of the hermit thrush is often heard.

In dark Canadian-zone forests, the varied thrush too takes up his magic flute. Bowman Lake, Glacier National Park, Montana.

The Singer Celestial

By JOHN LINDSEY BLACKFORD

Photographs by the Author

THE WAY is up an abandoned road, where one toils ruggedly through wooded gulches to climb at last, near to exhaustion, over the shoulder of Red Mountain. One senses that pioneer wagons gouged this ancient rut through the high, heavy, humid forest. Now mountain maple, devil's club and saskatoon meet and close across the narrow track of the forgotten trail.

A foaming cascade muffles with throbbing thunder the wind-song playing amidst swaying crowns of forest titans in the ravine. Shifting shafts of sunlight probe the dim, luxuriant fern-levels. And intermittently great scintillant drops of rain splash upon the emerald, leafy canopy of the under-wood.

At last, when one attains to the dank fastness of the mountain timberland, comes compensation for that tiring ascent. There, where spired alpine fir lift our thoughts heavenward, where the pointed, silvered spruce directs the gaze toward the firmament, a song empyreal is heard. It is the song of the hermit thrush. Seldom is the divine so nearly unveiled to us. For its duration the celestial gates are parted, and we hear an angel voice.

From silent, somber recesses of the dripping forest it comes chiming, ringing, to capture the wave-length of the soul.

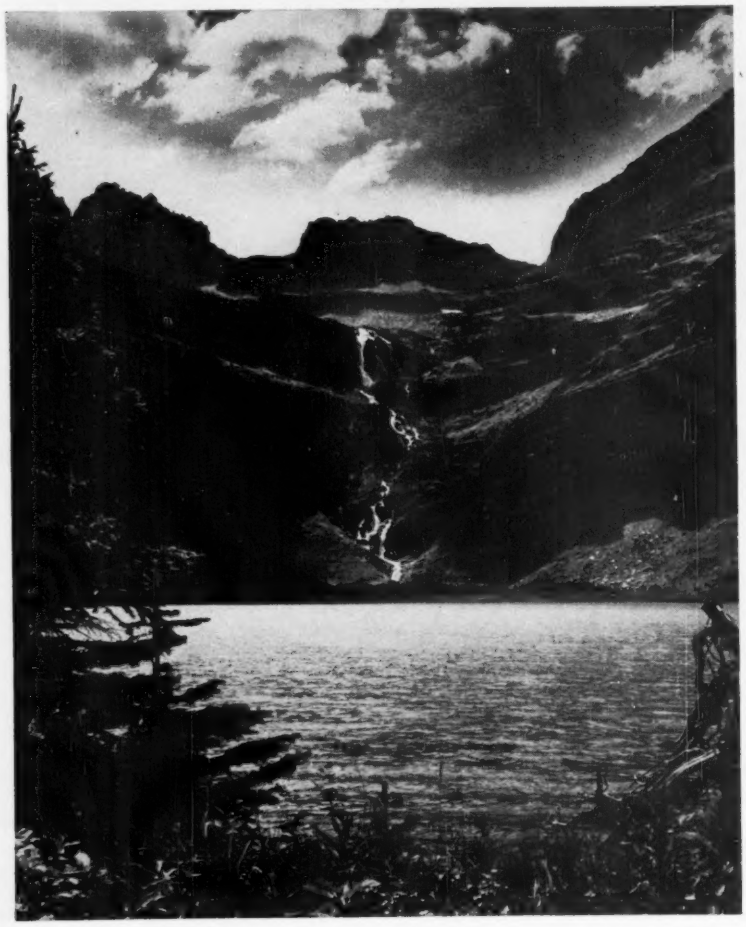
In its passion there can be no parting; to its love, no ending; with its joy, no sorrow. Again that sublime chiming. For pain there is assuagement; from trial,

deliverance; with affliction, hope. In a slow, serene repetition of notes, blended in liquid harmony, are expressed the sum of the heart's experience, the measure of the heart's desire.

Where heavy rain forests wrap the northern Rockies, the morning hymnal and lyric vespers of the Audubon hermit are alike delivered in varying, soul-searching phrases. When the mist-rain is falling, when the dusk-dark deepens, when the dawn-light brightens, the thrush performs his miracle of song. Its longer phases are characterized by chiming that is almost a silvern clanging; and they are separated often by an interim note—a musical sigh so inexpressibly poignant as to voice, commingled, ecstacy and grief immeasurable in one single note. But for its infinite compassion, it might not well be endured.

At length I steal cautiously toward the hidden songster, pausing and listening from beneath spreading boughs of sheltering, close-ranked evergreens. With slightest touch every twig and needle spills a row of crystal drops. As I search moss-hung and lichen-greened trunks and branches minutely, liquid notes pour from their depths. A stealthy step; another; at last one slow foot at a time, shifting weight with increasing care. Long waiting and watching. The drenched under-cover and soggy leaf-mould does not betray me. Yet the whole woodland seems attentive. There comes a long, unbroken silence. The hidden artist is no longer there. He has vanished without breath of sound. None the less, the song is renewed. Again, and yet again, it comes from beyond in the forest; but always returning to the heights of the ravine. An hour has passed, two; and I have not caught a glimpse of the divine songster, although I follow persistently.

Strange, then, that after long evasion, he should mount above the deep timberland to the pinnacle of a great, spear-like conifer. From there, chancelled against the sky, the hermit hallows the spot with surpassing song. If one is to see this thrush, then it is best to keep to the range of a single bird. Indifference grows at last within the breast of even the most retiring virtuoso.

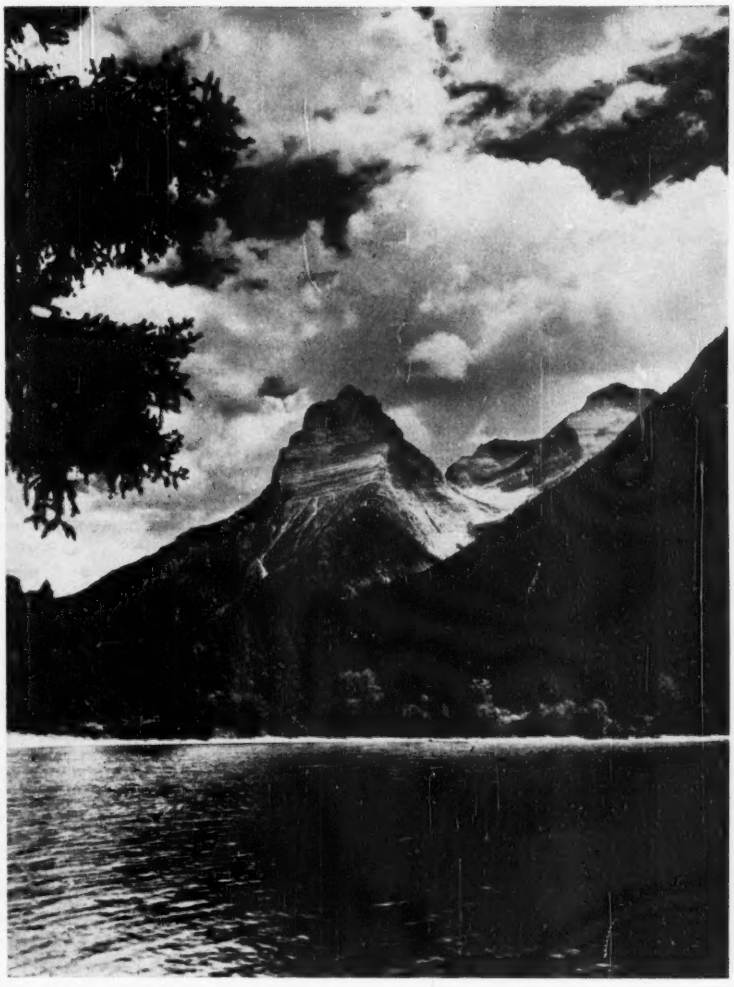


As I listen now three thrushes are singing—a divine trilogy. From the hill the hermit dominates the sublimated choiring. In the ravine the varied thrush, singing in the summer-springtime of this high, dark, Canadian-zone forest, takes up his magic flute. And from away in the leafy depths, the olive-back's mellowed cadences gild delicately the pattern of their transcendent song. It is not well for the spirit to be thus too long exalted; mundane things become less tolerable.

Again, close by a moss-banked rill, as evening shadows drape the temple-like aisles of hemlock and cedar, the hermit thrush declares his love. Another joins him, and from the dripping forest their silvery clangor comes chiming like the slow pealing of heavenly bells. The distant minstrel

The choral of hermit thrushes rises in forest fastnesses, where mountain torrents thunder down from Alpine snow fields above. Grinnell Falls and Lake, Glacier National Park.

Where spired spruce and fir climb the flanks of towering peaks, the inspired chiming of the hermit thrush hallows the somber wild. Kinnerly Peak above Kintla Lake in Glacier National Park, Montana.



seldom renders the interim note, but chimes endlessly, varying the pitch.

It is of the heart's ache and the heart's break; of the soul's exaltation and the spirit's peace. Who but Deity taught thee of this redemption, this atonement? Whence, save of Divinity, thy knowing of the splendor to come?

The roar of the torrent enfolds the forest with muffled thunder as I descend to the dim track beside its white cascades. Then a muttering of thunder overhead — a sweeping rain-veil lashing the underwood — and last a glimpse of sunset glory.

Slowly I turn to follow the ancient road down the ravine. The velvet curtains of the dark are falling about the columns of the forest. The Voice is silent, yet it is not stilled. With certainty we know that we shall hear this voice among those proclaiming paradise.

The Sea Shell

By COSETTE MIDDLETON

I used to hold this shell against my ear;
I listened for the language of the sea —
The sounds my cousins told me I would hear:
"A whispered roar" — both peace and treachery
Of water concentrated in a swirl
Of smooth, pale substance that my hands adored;
I was an anxious, jealous little girl —
What depths and distances my ears explored!
My cousins heard the ocean in this shell;
The loneliness of space was in the swell
Of tidal rhythms, dark and wet and wild;
But even now, as when I was a child,
I hear familiar music in this horn;
The sound of wind through fields of Iowa corn.

The Polar Bear—Friend to the Eskimo

By J. LESTER MINNER

Illustrations by R. Bruce Horsfall

When well-fed and fat the polar bear is good-natured and harmless. He also has a great deal of curiosity and will watch an intruder interestedly, sometimes standing up on hind legs for a good look.

★

OF ALL the animals known to the people of the Arctic, the polar bear is the one most highly respected. He is an intelligent, versatile traveler, an ingenious hunter, and a ruthless killer. Utterly devoid of fear, he is master in the realm of tooth and claw. He is, nevertheless, a great favorite with the Eskimo—at once their most formidable enemy and their best friend. The sight of a polar bear thrills an Eskimo hunter as nothing else can thrill him.

The polar bear is appropriately dressed in white that harmonizes with his surroundings. So perfect is his protective coloring, against a background of ice and snow, that he can approach a person, or another animal, with little chance of being observed. Only his black nose is visible, and this he sometimes covers with his tongue as he stalks his prey. He is completely covered, even to the soles of his feet, with long thick hair. This hair, when wet, gives an unbelievable toughness to his skin, always difficult to penetrate.

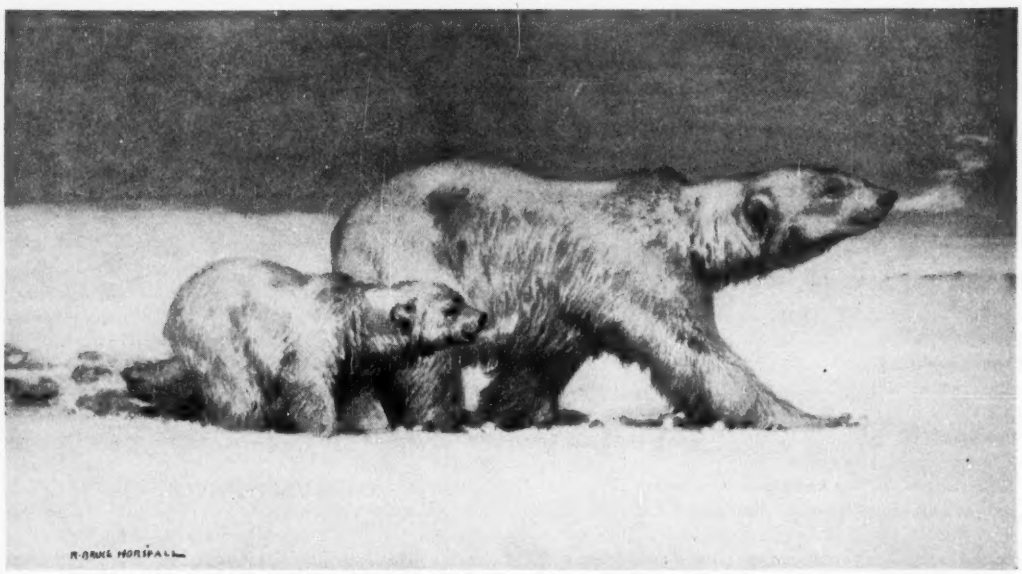
Although slightly smaller than his cousin, the Alaskan brown bear, the polar bear is, nevertheless, one of the largest animals of the Arctic. Only the whale and the walrus are larger. A majority of the skins taken at Wainwright are twelve or thirteen feet long. The size of this animal may be pretty accurately determined by the width of his track. A twelve-foot bear's track is about ten inches wide.

The polar bear is a great traveler, and he appears to be perfectly at home in the environment in which he is found. In summer he rides the permanent ice floes toward the polar cap. In fall and winter he stalks hair seals and ugruks, or giant bearded seals, on the new ice along the Arctic shores, and frequents the beaches in search of dead carcasses cast up by the autumn storms. In the early winter the female goes inland, where she hibernates under the snow long enough to give birth to cubs, usually two. The male bear continues to prowl about during the time his spouse is occupied with this family duty. Spring finds the mother bear and her cubs again abroad on the ice ready for a summer cruise. In the late summer, near the southern limit of the animal's range, as on Hudson Bay, the male may eke out his general diet of flesh by generous meals of grass from fertile land borders.

The mother is careful to protect her young. In time of danger she takes to the water, and, with the cubs clinging to her, swims to safety. As long as no danger threatens, she will not allow the cubs to hang to her, but insists that they "paddle their own canoe." When they disobey, she punishes them by cuffing them or ducking them under the water.

The polar bear is a skilled hunter whose cunning is not exceeded by that of any other mammal of the North. He stalks his prey, moving stealthily, until he approaches within a few yards. Then, with great speed, he gives a few swift gallops and slides in for the kill, for all the world like Ty Cobb used to slide into a stolen base. It is interesting, indeed, to watch a polar bear approach a seal.

After the days lengthen in spring, hair seals often come through air holes, which they have kept open during the winter, and lie on top of the ice in the sun.



The mother polar bear takes good care of her young, protecting them in time of danger, but she does not pamper them, and she tries to teach them to care for themselves as soon as possible.

A seal thus engaged usually sleeps about two or three minutes and then lifts his head and looks about for enemies for about fifteen seconds. When a polar bear spots a seal so occupied, he approaches it slowly and with the utmost care. Using his chest and front legs as runners, the polar bear pushes himself forward, taking care to move when the seal is asleep, and to lie motionless when the seal raises its head to look about. With infinite patience, the bear advances to a point where the seal is least likely to detect his presence. Then, the bear darts swiftly across the ice and grabs the unsuspecting sun-bather.

Although the bear eats only the choicest part of the seal, leaving most of his kill for the Arctic foxes following in his tracks, he has an insatiable taste for carrion and may be depended upon to swim ashore wherever there are dead carcasses. The more putrid the meat is, the surer it is that he will sample it. He frequently carries carcasses to the water's edge and allows them to soften and thaw out in the salt water before partaking of such "dainties."

Despite his great strength and intelligence, the polar bear does not enjoy undisputed mastery of his environment. Both men and dogs at times dispute his power and cunning. In the little village of Wainwright, Alaska, hunters returned from their traplines twenty times during a recent month with sleds loaded with polar bear meat and beautiful white robes, ample testimony that man is the bear's worst enemy. The Eskimo's dog, too, does not hesitate to attack a polar bear, his most hated enemy.

In their teams many Eskimo hunters have one or more dogs especially trained to heckle a polar bear and keep him from running away. When fresh polar bear tracks are seen, these trained dogs will be taken from the sled, stripped of every bit of harness—even their collars—and released on the trail. The dogs will quickly overtake the bear and, if on smooth ice, will give it a bad time indeed. Dogs can outrun a bear and are quick at dodging. They can, therefore, slash away at the bear's hind legs when he attempts to travel. A couple of good Eskimo dogs can hold a polar bear at bay for some time. At such times the bear becomes greatly flustered, as he can do nothing but concentrate on facing the dogs. Should collars be left on the dogs, however, the story will be quite different. In that case, sooner or later, the bear will be able to catch hold of the collar and pull the dog to him. On rough ice, also, the dogs get into trouble. There the dogs must go around obstructions, whereas the bear can gallop over them. He can, therefore, catch and kill his tormentors.

When well-fed and fat, the polar bear is incredibly good-natured. At such times he is harmless. As soon as he becomes aware of the scent of man, he will slip quietly away and hide behind rough ice, or go into the water. He has a great deal of curiosity, however, and will stand upon his hind legs to get a good look at the intruder. Sometimes a polar bear will follow an oomiak or kayak in the water, apparently just to see what makes it go.

Polar bear cubs are very playful and make affectionate and dependable pets. A few years ago a Wainwright whaling crew killed a mother polar bear and captured a small cub. At first the little fellow clawed and bit violently at his captors. All night he cried for his mother. On the second day, however, he ate a little

fresh seal blubber and thereafter accepted his captivity without protest. In a short time he was a great favorite with everyone in the village. Whenever any person came near, the cub would stand on his hind feet and, like a boxer, weave his head from side to side and spar playfully with his pretended adversary.

One rainy day the ugruk skin rope, with which the pet was tied, came loose and allowed the cub to go free. He remained about the village for many months, affording the people here an excellent opportunity to study a young polar bear's habits.

All summer and fall this cub chased wild ducks in lakes and streams. After his hunger had been fully satisfied, he used to stand on his hind feet and play catch with a dead duck. He would throw the bird high in the air and catch it before it hit the ground, for all the world like a school boy playing with a ball. Although he was not in the least afraid, he never allowed any of the men to come close enough to put a rope on him after he had slipped his bonds.

During periods of semi-starvation, the polar bear loses his pleasant, easy-going ways and becomes a canny hunter that knows no caution. Dogs, foxes, and, occasionally, a luckless hunter become his prey. Hunger is then an obsession with the bear. Not even a mortal wound from a high-powered rifle will divert his attention or interrupt his feasting upon a kill.

Junior Brower, a grandson of the late Arctic trader and author of *Fifty Years Below Zero*, last winter had an unpleasant experience with two hungry bears. While returning from his traplines, Junior sighted the two large animals about 500 yards from his father's house. While the bears were busy killing the dogs in the team, the boy got a good start; nevertheless, he reached shelter only a few feet ahead of his pursuers. The bears were stopped with bullets from Tommy Brower's rifle right in the doorway. Less than a week after this incident, a hunter at Point Lay killed a polar bear while it was eating blubber at his igloo entrance.

A few years back, two Eskimo hunters were seal netting through the ice in front of Point Hope. These men, who had neglected to take rifles with them, were in trouble when they saw two hungry bears stalking them. Both of the men climbed up on some rough ice and determined to use their ice hooks for defense against the bears. At the last moment, however, the hunters lost their nerve and attempted to run away. One man got back to the village, but the other was not only killed but eaten right where he was overtaken. The unfortunate man's clothing and some blood stains on the ice told all too clearly of the Eskimo's tragic fate.

Dangerous though he may appear to the white man, the polar bear is, nevertheless, a great boon to the Eskimo. Where polar bears are plentiful, droves of Arctic foxes are sure to be found. Because polar bears tend to congregate where Arctic animal life is abundant, his presence is believed to be a good omen. He is not only a worthy hunting prize, but he is a sign of good fortune—a symbol of plenty. His presence insures fat babies and happy, healthy Eskimo children.

Recently an Eskimo friend of mine returned from a successful polar bear hunt. His eyes shone with delight as he said, "Oh, boy! Oh boy! Oh boy! Was I glad to see that kind of animal! Never before, it makes a long time since I've had so much fun."

Indigo Bunting

By BERYL STEWART

A flash
Of blue, a burst
Of lovely song at noon.
At last a bit of sky has learned
To sing!

★

Thoughts from the Backwoods

By OSCAR OSTLUND

YOUR delight before the grandeur of the fiery, far-spreading sunset indicates that you are qualified to love a tiny patch of yellow clay that flowers at your feet, lustrously and golden in the slanting beams of light.

* * *

The ineffable light of creation shines with a special loveliness on the object of beauty that dwells superbly aloof from the material works of man. Eloquent in its desolation, the twisted tree at timberline speaks to your soul of some capital that you have together in common. This is the capital of divine detachment from the rush and uproar of man's fabricated world.

To the rational sense, materialistic philosophy has the appeal of a torch that is lighted near at hand. Its illumination attracts the eye that is focused on local things. Like the firefly, the light it sheds is cold; powerless to penetrate the night. And though it makes a show of brilliance in the darkness, it gives you no real bearings in the wilderness of thought.

* * *

In the passage where the stream meets opposition; where it finds the most obstructions to its flow — there the murmur of the running water, rises to its highest pitch of joy.

A typically small-headed pigeon is our mourning dove, whose family has been associated with human culture for four thousand years.

The Dove Is Doubtful Game

By PAUL SHEPARD, JR.

Photographs by Lee Jenkins

THE Fish and Wildlife Service is currently concerned in respect to the mourning dove. This is because the Service must soon decide between the divergent opinions of two major groups of our citizens —those who wish the bird to continue on the game lists, and those who oppose this action. In a measure, this difference of opinion is sectional, for most of our northern States have never treated the dove as a game bird, while most of the southern States have legally killed it for some years. But this division of opinion is by no means strictly sectional, for during recent years many residents south of the "Mason and Dixon" line have registered in the public prints their conviction that the dove should be removed from the game lists. Conversely, most of the bird-lovers in the North seem satisfied with its local status as a protected species, and have not actively opposed its status in the South.

Our dove, a century ago, was not seriously considered as game, North or South. But with the improvement in firearms and a decided increase in our human population, the supply of upland game birds suffered serious diminution. The heath-hen, originally common in several northeastern States, soon suffered virtual extirpation, and is now no more. Sportsmen of the South, threatened with a dearth of upland game birds, demanded some substitute and the dove was offered and accepted. This was about 1886. Thus the mourning dove was given game status, and by 1902 its killing from July to February was permitted. However, a few organizations in the South must be credited with the later decision to limit the dove's open season to 42 consecutive days, with some of the States choosing not to accept the full privilege. Here, then, is a bird that is shot as a game bird by a part of our citizenry and protected at all seasons by others.

Soon, in certain States, it was subjected to an open season of more than six months, with a daily bag limit of 25 birds. Later the seasons and bag limits were reduced and friends of the dove succeeded in outlawing the practice of baiting and in reducing the outrageous bag limit.

In the mourning dove we have a beautiful bird, almost entirely beneficial in its habits, rearing its young in our dooryards, or remote from man's dwellings. It is a messenger of spring in the northern States and everywhere welcome. It is a member of the pigeon family, which for forty centuries has been chosen by thinking people to symbolize the qualities that distinguish humanity from the other animals. And yet we shoot this gentle, trusting bird! Is this not a cynical incongruity, and a sinister comment on the quality of our thinking regarding "game"? Let us

Two creamy-white eggs are the usual clutch, although often there are three and, rarely, only one. The nest is so frail that occasionally the old bird itself may accidentally dislodge an egg.

consider more seriously this bird that we permit grown men, seemingly civilized, to shoot for sport, even when it is still taking care of its helpless young.

Wherever the mourning dove breeds, it is well-known to the country people. It raises its young practically everywhere within our boundaries, excepting only on our highest mountains, and in sections of heavy snowfall must move southward in winter, for its food is almost entirely found on or near the ground. This fact, combined with the long nesting season, has always offered difficulties in its administration as a game bird.

Doves nest from March to October in the middle States, and almost the year-round in the Southeast. This has always resulted in a somewhat wanton approach to its hunting. According to the Fish and Wildlife Service, the long nesting season "immeasurably complicated administration, as shooting in September in any of the States south of the line made by the northern borders of North Carolina, Tennessee, Arkansas, and Oklahoma always causes a heavy loss of young birds in the nest." In other words, the sporting ethic against killing animals in their breeding season is disregarded.

North of the aforementioned line the young doves, just out of the nest, gather in flocks and begin to go south as soon as they are able to fly. Some flocks move southward by the end of July. These birds, the logical bulk of the hunter's harvest, are obviously unavailable. The season is a botched-up affair and game departments are in a quandary as to where to limit it. Since the dove is not heavily hunted in Kansas, Missouri, Illinois, Ohio, Indiana, and Pennsylvania, some State officials assume this area to be a great untapped game resource. But so are its robins, grackles, red-winged blackbirds, and other birds, if one follows this philosophy.

Some other characteristics of the dove also lend themselves to questionable hunting practices. Unlike most game birds that are either aquatic or cursorial and dependent on cover, the dove is extremely volant, moving swiftly over open fields in search of food. Thus it was formerly subject to baiting, which is now illegal. Its feeding habits are always difficult to predict, and some hunters seem to feel that their time is wasted with baiting forbidden.

The nest of the dove is a crude platform of small sticks. One, two, or three white eggs are deposited. The flimsy nests are vulnerable to enemies and storms, and many of the eggs, or young, are thus destroyed. Some enthusiasts have erected artificial nesting platforms to encourage the dove around the house, and are sometimes successful in providing stable supports that the birds will accept as foundations for their homes.

The male, in courting, takes a long cruise directly away from its intended mate, clapping its wings loudly above and calling attention (we suppose) to its departure. After proceeding for a hundred yards or so, the bird circles and glides back to the starting point. This convincer is called the "nuptial flight."

Parent doves are instinctively determined. If its eggs are destroyed the pair starts over again. They will do so repeatedly, even if it takes all summer and the early autumn to rear a family. If successful, the first or second time, the old birds may return to the nest to bring off additional broods during the summer. One amateur ornithologist banded three successive broods in the same nest. The dove's devotion to this habit is perhaps unsurpassed among birds.

Young doves are fed for the first few days on "pigeon milk," a throat secretion regurgitated by the parents. This "milk" is produced by members of the pigeon family alone, and is an important element of the diet, of the young, along with food predigested by the parent.

Our records of the pigeon family go back 4000 years, and are connected closely with the history of man. Babylonia was called the "City of the Dove," for the rock dove, which is native to the lands around the eastern Mediterranean. Its figure long ago caught the imagination of architects, historians, poets, prophets, and theologians. The Greeks designated it the official bird of Venus, for it has long been the symbol of gentleness and love.

As Noah's messenger the dove brought the olive branch to the Ark, and it is still the traditional bearer of the olive branch as a peace symbol. It is represented in ecclesiastical furniture in medieval, Roman Catholic figurines, which are now rare and valuable. Doves are often depicted accompanying the saints. A dove served as oracle to Mohammed, supposedly perching on his shoulder to whisper words of wisdom in his ear.

A Story of A Dove

By GRACE V. SHARRITT

Young doves on the flimsy platform that passes for a nest. Enemies and weather account for a high mortality among young doves, but the parents simply start over again with another — or the same — flimsy nest.

THE DOVE cooed poignantly from its perch on the buck-and-pole fence. I rarely hear this haunting call without a feeling of intense nostalgia. Like some faint echo of the past, the song stirs memories of other scenes, of days of childhood.

Along the fence where the dove troubled the summer afternoon with its plaintive notes, the yellow prairie clover was in full bloom, and the air smelled of hot sunshine on the sage-brush. Cliff swallows dipped and wheeled in the sky, for it was the season when bird-families were gathering in great companies, preparing for flights south. On the creek in the field floated four white swans. The scene and the mood of the hour was one of unbelievable peace.

Again the dove softly called, "Coo-a, coo-coo-coo," as if to impel my thoughts to its problems. I closed my eyes, blotting out the brown-sloped Wyoming buttes, and the picturesque canyon that was my horizon, and gave myself up to the cadence of the bird and its long-ago memories.

I followed a path — a path into a lovely Indiana woods, where scents were sharp and pungent of pennyroyal and mint. Brambles of wild roses and blackberries bordered the path, and from an old rail fence a dove fluted soft notes of enchantment to a child's world.

My father walked before me in the path. He had a gun. He was squirrel hunting. Although I had been trained to believe that small game, quail and ducks that were on our land were ours by some mysterious, divine inheritance, I never enjoyed watching my father kill them.

A squirrel ran the length of a fallen log, swiftly climbed a tree, then fell to the ground. "Soon will have enough for a pot-pie," my father said.

I pretended not to hear.

We walked on. I picked wild flowers for my mother. They may have been lady's slipper, or pale orchis, I do not know. But what I picked, never grew again, for I tugged until roots, leaves and stalks were mine.

No one ever said, "Save the wildflowers for the future."

What future?

What future could one ever dream to be so dark, that the very woods in which we walked would become some day a wasteland? The timber marketed, the brooks drained, the ducks gone, and the wild flowers vanished.

What a future!

My father would have laughed in scorn. My mother would have gently smiled, "Pick all the flowers that you want, dear."

Those were the years before World War I. "Conservation" may have been a strong word in Webster's dictionary, and a slogan of Theodore Roosevelt, but as a term of warning to be applied to daily life—"to preserve our fast depleting natural resources"—it had not penetrated the home, or the thinking, of the common man. For if it had, we would not now be so concerned *today* with low water tables, with despoiled wilderness areas, with soil erosion, or the disappearance of various wildlife species.

The flowers wilted in my hand. I tossed them carelessly away, and bruised sweet blackberries to my mouth. The dove on the rail fence echoed its woodland obligato, and the pink wild roses stirred softly, as if in rhythm; unforgettable impressions were etched on a young mind by this day's woodland experience.

My father shot another squirrel. "Let's turn back," he said. "I have enough and the sun will be hot in the lane."

Just then the dove repeated its theme. "Coo-a, Coo-coo-coo," it sang to the woodland. "Coo-coo," it sang to me.

Within a split instant, it seemed, I heard my father's gun. He walked to the fence and picked something from the ground.

"Look!" he shouted, "this is for you."

He brought the dove to me, still warm with fleeting life. The soft feathered wings fell forward. The small head drooped. I recoiled in terror.

When I made no effort to reach for his trophy, he repeated, "I shot it for you," and bestowed upon me one of his rare smiles.

"Don't you like it?" he asked in amazement.

I started to cry. My father hated tears.

"But it was so pretty on the fence," I sobbed. "I liked it on the fence best. It can't sing any more."

He stormed angry words. But they made no impression. For I could not help weeping for the dove that had been alive on the fence, and now was dead and useless at my feet.

My father stalked home in grim silence. I trailed miserably in the rear. The dove lay in the woods. The woods that were sharply scented with pennyroyal and mint; the woods with wild rose thickets and brambles of blackberries.

Once home, I went to my room in disgrace. Or so I thought. That night after our supper of squirrel pot-pie, my father asked me to come and sit with him. He held me close.

Then he solemnly said, "You have cured me from ever shooting a songbird again. You are right. They *are* much prettier, singing."

The dove twirled its lonely call above the yellow prairie clover and the brush of sage. The summer scents smelled sweet in the air. On the creek in the field floated four white trumpeter swans.

Four swans of a species so rare, that in those years when my father and I roamed the woods together, they were near extinction. They were only on this Wyoming creek, now, through forces moved by conservation measures, and by foresight and protection.

Certainly the mourning dove is diminishing in numbers. Is it not time to take heed, before it is too late, and to protect the dove as was done for the trumpeter swan — but not for the passenger pigeon?

The dove on the buck-and-pole fence again uttered its haunting refrain, "Coo-a, coo-coo-coo."

Was its song, I thought as I watched the bird wing to its evening roost in the cottonwood, a warning?

Sassafras *By* GLENN R. DOWNING

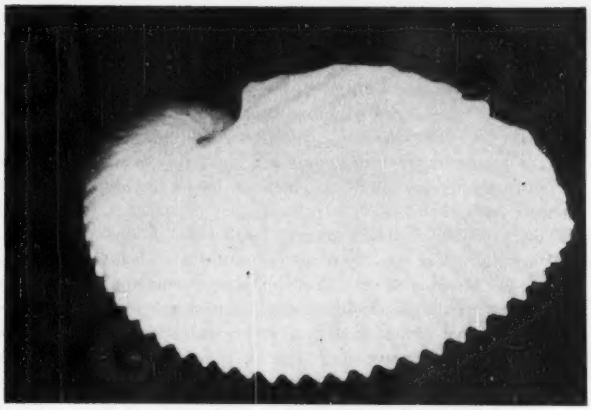
ADDING to the varied colors of autumn as they spread across our northern States are the scarlet and orange leaves of the sassafras. The leaves of this tree are interesting not only because of their bright colors in autumn, but also because of their shapes. Some are oval; some are mitten-shaped; others are three-lobed. The leaves are also aromatic, and it is this characteristic that has made them desirable as a beverage and as an ingredient in soups. It is the bark, roots, and berries, however, that have been used more often for beverages. In recent years the use of sassafras has dropped considerably, but there are still some who find traditional the use of sassafras tea as a tonic. The oils are extracted and used for flavoring in root beers, in medicines, and formerly were used in perfumes and soaps. Other uses have been recorded. It was employed extensively by the American Indians, and the tree played an important part in the exports of the early American colonists to England.

Sassafras belongs to the Laurel family. In its northern range it is usually merely a shrub, while in the South the tree reaches a height of from forty to eighty feet, with a trunk three to six feet in diameter.

Sassafras wood is durable and easily worked. It is used for cross-ties, fence posts, and furniture.

The Paper Nautilus

By GRACE SHULTS DAVIS



Discarded egg case of the paper nautilus.

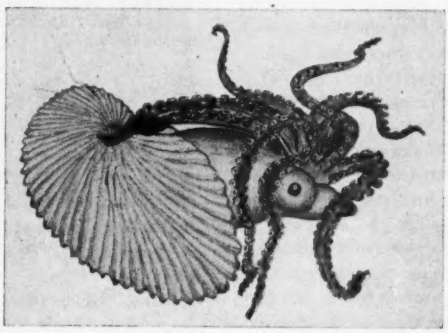
Not all the "shells" picked up along beaches are the external skeletons of various familiar marine animals. Certain of the objects may be internal skeletons of such mollusks as cuttle-fish, squids, devilfish and sea slugs. Others are egg cases manufactured by several types of mollusks.

Of these egg cases, the most beautiful is the delicate, pearly-white, fluted shell of the argonaut or paper nautilus. The animal carries the keeled, spiral shell clasped in two of its eight arms. The shell is formed by limy secretions from glands near the tips of the two arms, which subsequently cling to the shell during the remainder of the creature's life.

It is obvious that the egg case of the paper nautilus differs from the more familiar molluscan suits of armor developed from secretions out of the mantle and to which the animal is fastened by an internal muscle. In the latter case death results if the mollusk is separated from its shell. With argonauts only the female nautilus bears the egg case, and she carries it lightly by her finger tips as if it were an oversized lady's purse into which she can hastily retreat whenever she desires more privacy and security than is afforded by the open expanse of public ocean. Actually the analogy might be improved in this instance by comparing the case to a bassinette designed for the lady's baby and carried around by the lady in the event she needed convenient shelter from sudden dangers lurking in the world about her. This may sound silly, thinking of human ways, but it is the actual situation as far as an argonaut is concerned.

While the special purpose of the cradle is for the deposition of eggs, the animal carries the shell at all times, retreating into it completely, or remaining wholly outside of it at will.

In the accompanying illustration the argonaut, nearly out of the shell, is in the position it assumes when leisurely floating through the water. The mouth, invisible in the sketch, is surrounded by the eight arms and is pointing upward. The proboscis-like organ in front of the eye-bearing head is the siphon, and it provides very effective jet-propulsion, sending the craft swiftly into reverse at the slightest danger signal. Operation of the unique hydromatic drive is as follows. When the creature is at rest, the water flows in and out through holes around the free edges of the mantle and over the gills. Should a sudden get-away seem necessary, in one flash of movement the creature backs into the cradle, throws the eight tentacles backwards over the keel of the cradle, clamps shut the edges of the mantle, and the water is thus forced out of the siphon, driving the animal abruptly sternward. It is as if the bulb of a water gun had been squeezed by a big hand with results comparable to those when a violent stream gushes from a fire hose.



The paper nautilus, *Argonauta pacifica* Dall, a small and beautifully colored octopod, shown partially out of the egg case that it occupies at will. The case is fastened to two of the tentacles, and is always carried along. The eye is real, not an imitation. However, the proboscis-looking piece of anatomy in front of the head is not a mouth as it may appear, but a siphon that enables the creature to operate as a jet-propelled job. The mouth is concealed by the arms which surround it. Slightly less than one-half life size.

When feeding, the argonaut draws its body out of the shell and turns over into what would seem to be the normal position for an octopus in the first place, with the mouth directed downward and the suction discs of the tentacles on the underside, enabling the animal to crawl along through the mud or cling to rocks or to water plants.

Unlike other mollusks, the Cephalopod group to which the paper nautilus belongs, and which also includes the other octopods and squids and cuttlefish, has a highly developed anatomy, far more complicated than that of any other group of mollusks — in fact, higher than any invertebrate in the sea. Compared to the more simple physiology of such mol-

lusks as oysters, clams, and snails, for instance, that of Cephalopoda, with auricle and ventricle chambers in the heart; with veins, arteries, kidneys, intestines; with a nervous system that can boast of a brain composed of well-developed ganglia protected by cartilage, and with an eye resembling a vertebrate eye, having a lens, a transparent cornea, and a retina, this group would really seem to merit classification into a phylum distinct from Mollusca.

You would be quite overcome, I am sure, if upon opening an oyster you were to encounter an almost human eye blinking at you. Yet should you come upon an argonaut emerging from its shell, you would see a very expressive eye looking out coyly and bashfully from between the protecting tentacles.

None of the Octopodia are so repulsive and ferocious as their ill-deserved reputation would have them. The sharp beak in the mouth is designed for handling food and not as a weapon of defense. In many instances the author has handled small octopods — up to two feet across — in moving them from deep tide pools to more shallow ones for purposes of observation. Although the creatures would coil the exploring tentacles about our arms in efforts to escape, not once did any of them attempt to "bite" their captor.

The nautilus, sung of in romantic phrases in literature, is a beautiful little creature, averaging about six inches in over-all size and glowing in iridescent rainbow hues of rose, orange, yellow, green, blue, violet, and varying shades of brown. A treat is in store for those persons so fortunate as to look upon a living specimen. And should you find one of the dainty cradle shells, it will be a treasure to keep, although careful handling will be necessary to preserve its fragile texture.

They Look So Real

By DUANE VALENTRY

LAURA MACKAY has one of the most nearly unique jobs in the world, and her handiwork rivals Nature's own. She is the skillful maker of flower models for the Museum of Science in Boston, where visitors continually compliment her work by mistaking it for the real thing. Some of her flowers may be seen in habitat groups, while others form their own display of New England varieties.

Anyone who has ever examined a flower closely will have some idea of the task involved in reproducing one. Working with dentists' and sculptors' tools under a magnifying glass, Miss Mackay achieves her astonishingly natural effects with wire, fine silk threads and China silk dipped in wax. From these she fashions tiny pistils and stamens with painstaking care and a steady hand. Assembling the many minute flower parts on the stem — petals, leaves, sepals, pistil and stamens — calls for infinite patience and a thorough knowledge of wild flowers. A single stalk of meadowsweet, for example, requires two hundred flowerets and fifty leaves. Most difficult of all is the achieving of exact shades of color, such as the blue of the gentian.

Expressing her talents in sculpture, painting, portrait and photography helped prepare Laura Mackay for her artist's job of flower-imitation. She also has made tiny dolls with exquisite plaster of Paris heads and plastic wood limbs. An early association with the great naturalist, John Burroughs, and childhood summers spent on Long Island, Cape Cod, and in the Catskills and Adirondacks, gave her a background of Nature lore and love of growing things. First translating this love of wildflowers into models about eight years ago, she experimented with arbutus and Indian pipe to attain exact reproduction of Nature. The Children's Museum first purchased four terrariums of seasonal blooms, and a collection was bought from the flower lady for the Springfield Museum.

Laura Mackay attaches a cluster of blossoms to a stalk of meadowsweet.

Today, working exclusively for the Boston Museum of Science, she uses notes and sketches made in the field to guide her work, as well as books on flowers and dried specimens. If she does not know a flower in every detail, Miss Mackay waits for summer so that she can refer to the real thing for perfect accuracy in her copy.

She has made in all more than sixty kinds of flowers, and is at present concentrating on creating clumps and clumps of goldenrod so that when it is used in the museum it will grow as it does outdoors, in masses.

The Dooryard

By RUTH M. RASEY

Illustrated by Garnet Jex

"An accommodating fence it was. . .we clung to its tall gateposts. . .to peer into the nests of baby robins among the maple branches. . ."

IT NEVER was a lawn. It was always just a dooryard. Into it opened the doors of our old saltbox house, and out of it, toward the south, swung the gate to the crooked little dirt road that wound its way over our hill.

The quarter of an acre, "more or less," was first fenced in with uprooted stumps back in the early 1800's. Later Great Grandfather set a fence of crutches (crotches) and rails to enclose the yard. But in my day, a weathered board boundary appeared and disappeared among the willows along the barnyard to the west; the lilac hedge east of the gate to the south; and among the western shade and eastern apple trees.

An accommodating fence it was. Across its bottom boards, we young ones set our teeter-totters. Or we clung, to its tall gateposts, standing on the topmost board, to watch for Father bringing home the cows, or to peer into the nests of baby robins among the maple branches, which almost interlaced above the great old iron-hinged posts.

"For more than a half century, a three-foot curb of cobbleheads framed the top of the well."

And where the yard fence met the meadow wall, at the northwest corner, there was a two-foot gap at the top of the bank that sheered down to the road. A bar-hooded gap it was, shutting out four-footed intruders, but permitting family and neighbors to squeeze through, when cutting crosslots in or out. Shawl and frock, sheepskin coat and small blue overalls have worn the inner surfaces of bar and uprights knottily smooth with countless seasons of use. A warming pan of coals when a neighbor's fire had failed; a big white birthday cake for my little brother Joe, when our mother lay ill; a shivering newborn lamb hurried from Uncle Joseph's draughty barn across the road to our wood stove's warmth, all helped to wear the narrow way to our kitchen door.

Frost annually heaved the posts askew and ripped out here and there a hand-forged nail, but May sun and the heavy maul from the adjacent tool shed soon set the fence to rights again.

Directly in front of the house, beneath the row of maples, was the well. A water witch with his dowsing rod first located the never-failing vein of water. Dug straight ten feet deep into the earth with pick and shovel and groaning joints, back in 1810, the well was more than once the family's salvation.

So precious was it that it was mentioned first in Great Grandmother's widow's dower in 1844: "We then set off . . . . one piece of land, beginning on the north side of the highway from East to West Rupert, at the center of the well."

For more than a half century, a three-foot curb of cobbleheads framed the top of the well. Above this, a wooden windlass operated a rope-suspended, hand-made hickory bucket, and a great dipper gourd, or a tin quart cup, hung ever ready on a square-headed iron spike in the roof. Crystal clear and ice cold, even on the hottest August day, was the water dispensed from the well's rocky depth to family or wayfarer.

In 1863 Grandfather was no longer content with the clumsy hickory bucket and windlass. Instead, he sent away for a chain pump with a tight, four-foot wooden top to enclose it and provide a sturdy spout on which to hang a pail. Seven dollars was the cost of that pump, complete with its fixtures.

When it was finally installed, and glorified with several coats of red buttermilk paint, no more modern waterworks could be seen for miles around. Children and grownups congregated there under the maples to try it out, and Grandmother brought out a panful of her plump cream cookies, to mingle their sweetness with the sweetness of the water.

Tragedy once pumped the well dry. Lightning struck the big home barn, which stood less than fifty feet from the house. It was a summer afternoon when Joe was a week old. Neighbors all up and down the mountain district, seeing the great flames and billowing clouds of smoke, poured on foot, on horseback, and in buckboards, into the turbulent dooryard. Each man or boy brought with him his biggest buckets or pails.

They formed a human chain from the well to near the blazing barn, and thanked God that it had been a rainy summer, as they desperately plied the pump handle to bring forth the only available water to hurl upon the end of the house, which was fast blistering

from the barn's inferno. Not until the wind abruptly shifted from west to east did the previous flow refuse to come to the frantically pumping hands.

Staring in helpless agony above her baby's head, out past the grim, sweat-streaked, smoke-blackened men, my mother suddenly saw the flames no longer lick at the house. As she dropped to her knees there by the window, her numbed lips moved with their first sound since the horrifying roar of the fire had burst upon the hill: "Thank God for the miracle of the wind—

"Every winter the sleigh loads of four-foot logs damp and fresh from the pasture woods. . ."

for neighbors — for the well."

But that Fall a new barn was built on the site of the old. Soon we children were again helping to bring the horses along the drive that formed a crescent around the front of the house, joining the barn at the west with the wagon shed in the east ell. How proud we felt as we held the lines, or clung to a harnessed back, or helped buckle the straps around the buggy thills.

What fun it was, too, to treat our own and visitors' horses to apples or tufts of grass, and stroke their velvet noses, as they stood tied to the hitching rings on the shed doors. So many horses had stood patiently there in the old dooryard — the doctor's horse while his master battled for life within; the mail carrier's, the peddler's, the parson's. And even impatiently pawing or cribbing nags of sundry suitors left their hoofmarks on the gravel. On what Grandfather termed "a prolific day for visitors," or when a bee or picnic, a funeral or wedding called family and friends to the hill, the dooryard would overflow into the meadow with horses and surreys or sleighs, or, in later years, with purring engines that, at times, likewise pawed upon the gravel.

Loads of wood for the woodpile came along that drive also. Every winter the sled loads of four-foot logs, damp and fresh from the pasture woods, were piled at the end of the ell. Sweet-smelling logs they were, of maple and ash and oak, of apple and hickory and beech, to feed the kitchen range and the next winter's fires.

Sometimes there was spruce, also, and then we would vie with one another to pry off the pungent lumps of hardened pitch or gum. Never was there better gum for chewing than were those pale gold and amber nuggets that we whittled away from the spruce bark on a zero morning.

How we wished there were no school the March day when the men came with the great circular saw and its gasoline or horse-powered engine. We could hear the huge blade singing a half-mile away, and by the time we would reach home at four o'clock, the logs would have become a great pyramid of stove-length chunks. Chunks that we would help to stack in neat tiers against the side of the ell wood-shed to season and dry.

Each day brought its joy and its task to the dooryard. There we learned to live by faith in the cycle of the year, knowing that even in its simplest forms, life will find its fulfillment.

Early each November the house was put to bed in a two-foot banking of straw and leaves, topped off with dirt and stone. That insulating wall all around provided more than a barrier to escaping heat. It supplied a prime runway for flying feet in games of "I Spy." And from it even a three-year-old playing outside could, by pressing his nose against the cold window pane, keep posted as to just the right moment for appearing in the kitchen to lick the cake spoon or ice-cream dasher.

The ell corner of the banking furnished, too, a sheltered nook each New Year's Day, to set our discarded Christmas tree. Many a little spruce there bore its feast for the birds — handfulls of oat and barley heads,

"So many horses had stood patiently there in the old dooryard. . ."

bits of suet, the corn-crib's nubbin ears, and sunflower seed, that had grown to plump brown kernels near that same ell corner, especially for these fluttering, feathered ones.

When the last snowdrift had melted, the banking posts and boards were taken down and piled out back to use the next November. Leaves and straw were wheeled in a creaking barrow to the barnyard, and the blush roses, the garden and lemon lilies, and the clove pinks would start again the luxuriant summer banking.

The first warm May day our whole family would turn out after an early supper to rake the dooryard. The peeper frogs in the marsh across the road, the hewees (or phoebes) searching for hair and twine to line their nests, and the bluebirds in the budding pear trees would spill their songs upon us as we worked. And when at last the great heap of dried grass and dead stalks would send up its acrid smoke to greet a young May moon, Sally and I would scurry away to the playhouse. Every spring we relaid the low walls of stones for our playhouse beside the back fence. Crude were its furnishings — salt bags stuffed with hay for beds; broken china and bits of slate for dishes upon a plank and stove wood table; a discarded wagon seat for a lounge. But when the giant crabapple tree shed its pink and white plush upon it, our playhouse became a palace indeed.

Later it would become a craft shop, too; a shop where holly-hock dolls would wear bonnets of canterbury bells and dwell amidst burdock seed furniture and carpets of moss from the pasture rocks.

But other spring evenings would call us to tend the flowers. Every year we love to hear again how Great Great Grandmother had set the lilac sprouts at diagonal corners of her daughter's house to guard it — as did the HL hinges on her doors — from spirits of evil. As we generously sifted lime, as she had plaster, around those lilacs, grown by our time into spreading trees, we fancied that each heart-shaped leaf and budding lavender plume might be warding off a goblin.

"The biggest, oldest Pound Sweet tree jutted a stout perch of gnarled and leafy limbs out over the road."

Tenderly we spaded the earth around the yellow roses, the snowdrops and the tiger lilies that grew where the dooryard orchard began. Tenderly, because our buried pets were sleeping there.

And as we spaded, we dreamed of gifts to come from bloom and fruit for summer and for Christmas giving. Lovely would be the bouquets for visitor and neighbor, for school and church, and for many a shut-in.

Too, there would be the potpourri and the rose beads that we girls loved to make from the falling petals. All year we saved the emptied salve jars to fill with that potpourri, after it had ripened in a brown stone crock. A mixture of haunting summer fragrance it was — petals of the red and yellow and blush roses; the starry white syringa; the cinnamon pinks; the late purple violets that grew at the edge of the "shade;" the tiniest leaves from the Balm of Gilead trees; mint, rosemary and marjoram from the herb bed, all chopped

"Neighbors. . .poured on foot, on horseback, and in buckboards, into the turbulent dooryard."

with cloves and laid in layers of salt, with ambergris to hold the scent.

And from the budding Baldwin near the fence would come the Comfort Apple or Pomander Ball. A firm, smooth red apple it would be, stuck as full of cloves as it would hold, to perfume a lady's dresses when hung by her favorite colored ribbon in among them.

Stringing the lattice for the Eglantine roses to climb to the east chamber window was among the lighter labors. As we balanced on the ladder, we recalled the story of the mother root's having been brought all the way from England to Plymouth colony by a homesick little bride.

Less welcome in that housewife's chest, so ran the legend, had been the plantain seed that had drifted in in the straw packing. As we had tugged at the prolific weed there by our doorstone, we, too, had thought it most unwelcome, until an accident revealed its value.

An ugly nail wound on my brother Bob's shin had resisted the doctor's remedies for weeks, causing our mother much concern. Finally, one day, remembering that plantain leaves were said to possess a healing property, she slightly wilted a handful and bound them on the stubborn sore. A few days later Bob's leg was completely healed.

Nor was the plantain the only medication that grew in our old dooryard. There was the tansy with its golden, bitter, button blossoms and fernlike leaves; leaves that when rubbed green on raw meat would keep away the flies. Or, when dried, made a distasteful tonic tea that was supposed to tone our systems.

Close by the tansy, in the shadow of the plum trees, grew the goldenrod, the oil of which in early days had been distilled to scent the family snuff.

There, too, was the prickly ash or toothache bush. When the seeds were simmered in fresh butter and kept warm on the back of the stove three or four days, an excellent poultice for an aching tooth was produced, when no dentist was at hand.

"Seven kinds of greens make a pottage to cure the ailing," was an ancient maxim. Such a dish was frequently served from the dooryard largess. Dandelion, dock, purslane, redroot, horseradish, scurvy grass, and cowslip all grew at the edge of the shade or among the willows. Nettles grew behind the shed, and even they made good greens also.

From those nettles we early learned a valuable lesson of life. If we took hold of their green stems half-heartedly, they stung us to a scarlet rash. But if we gripped their threatening stalks with all our strength and determination, they gave us sustenance.

Beneath the kitchen's east window was the herb bed, with its silvery-leafed sage for sausage and cheese and the holiday turkey. Bergamot, too, and thyme and marjoram to bring flavor to the plainest fare. Mint sprays bordered the bed, and tall heliotrope bordered one end. Catnip grew in clumps nearby, and many were the times we watched out pet kittens roll in ecstasy among its fragrant stalks.

One hot summer evening in the 1930's, that herb bed provided us with huge merriment. A couple of scientists who were visiting us were wishing for mint juleps, so they set about making some for all of us. Laboriously they crushed the ice, gathered the mint from the dooryard, and pulverized it with the mortar and pestle from the woodshed chamber. At last the glasses were pronounced properly frosted. Delighted anticipation beamed above each cup, as eager hands raised the drink. But suddenly expressions changed. Came a choke and a snort. "Lord, Ed," gulped the first to recover his voice," all you've got in this julep's *catnip*!" Grandfather always said catnip was good for hysterics.

Most fruitful was the dooryard orchard. Widely branching and gnarled Pound Sweet, Tolman Sweet, Pippin and Baldwin trees clustered along the fence. Damson plum and pear trees guarded the tangle of grapevines beside the row of currant and gooseberry bushes. And an August Sweet, crookedly grafted to a common fruit tree, shaded the great clump of wine-plant rhubarb growing safe in its half-barrel stockade.

No table setting or lunch bucket was complete without its apple or currant jelly, its spiced grapes or plum butter or gooseberry preserves. And best of all, for Sunday night's supper, were the great, yellow-green Pound Sweets, baked juicily brown, and cut, still hot and redolent, into bowls of johnnycake and milk.

To insure a good crop in the days before spraying was prevalent, the men used to burn sulphur in the cracks of those trees when they were in blossom, to prevent insects from stinging the plums or gnurling the apples, or black-knot from forming.

"Better keep the house pretty well shut up this morning, Mother. Shouldn't wonder if the air might be kinda thick round the orchard," was the signal for us to watch the annual burning. We all then helped scrape the loose bark off the old tree bodies to rid them of insects' hiding places.

But our own hiding-place there we cherished. The biggest, oldest Pound Sweet tree jutted a stout perch of gnarled and leafy limbs out over the road. What joy it was to nestle there in the friendly arms to read of *Little Men at Plumfield*, of *Hans Brinker*, and of the *Five Little Peppers*. Or to hide there when someone must turn the spitting, wheezing grindstone that stood near the barnyard gate, for the never-ending chore of sharpening scythe or mowing-machine knife. What fun, too, to peer down, unseen, at all who passed along the road or stopped at the bubbling water-box below. Or just to dream of far-off years and places while held to the secure present by Topsy's cowbell up the lane and the ringing medley of the neighbor's mowing.

It was in the dooryard orchard, too, that Sally and I one day experienced the rare delight of finding a hummingbird's nest. For days we had trailed the flight of the gossamer-winged rubythroat that gathered nectar from the sweet-peas at our back door. At last our searching eyes sighted the exquisite two-inch cup of dandelion down and moss and lichen fastened with strands of spider web to a branch of the farthest apple tree. It was our secret shared only with the tiny owners of this lovely little home.

Throughout the month of October, more than one generation of boys and girls Hallowe'ened in the dooryard. Among the weaving shadows wrought by hunter's moon and weird branches, pumpkin-lighted ghosts and gnomes chased one another or buried themselves in the piles of leaves. And there the romantic sought their fortunes from the pippin paring tossed unbroken over the left shoulder. Or from the seeds, each named in secret, stuck to one's cheek while one chanted:

(Continued on page 386)

Midsummer Evening

By MAUDE LUDINGTON CAIN

Warm as the clasp
of a baby's hand
The sun's last rays
press the patient land

Soft as the folds
of cashmere shawls
The hush of evening quiet
falls

Gently as starlight
treads the lawn
The fret and haste of the day
are gone . . .

Coolly, this moment
of peace apart
Bind on your spirit,
Hold in your heart.

Wasps, Bees, Ants and Their Kin

By E. LAURENCE PALMER

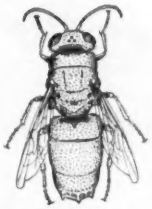
Illustrations, except ant and honeybee, by Ellen Edmonson.

This is the sixty-seventh in NATURE MAGAZINE'S *series of educational inserts.*

IN 1951 the government issued a synoptic catalogue of the Hymenoptera of America north of Mexico. It is doubtful that many readers of *Nature Magazine* will ever read the 1420 pages of this four-dollar book. Yet there are few readers of the magazine who have not at some time in their lives had dynamic experiences with some of the insects listed therein. Ants in our nether garments are supposed to match nests of yellow-jackets or hornets in banishing ennui and boredom from our lives. And, in spite of a planned economy designed to pay persons for doing nothing, there are still some of us left who do not think that the busy busy bee is wholly insane. Ants, bees, wasps and their kin are stimulating, no matter how you look at them.

We have no intention here of presenting any adequate picture of the classification of the members of the Hymenoptera. It could not be done in many times eight pages. Neither do we hope to deal adequately with the biology, the economy, the psychology, the influence on history, or the relation of these insects to human health. We will not tell you how to get rid of ants or hornets; how to raise bees or to decide whether one of the insects is "good" or "bad." We can merely introduce you to some of these subjects. Originally it was intended to avoid consideration of all of the fifteen hymenopterous insects dealt with in the *Fieldbook of Natural History*, but an article on this group could not well be written without touching on ants and honeybees. This introductory material is designed to integrate and introduce to the reader the eighteen species here covered in the tabular material, and to comment on their close relatives. There is every reason to justify a second article on this rich group at some future date. We have had inserts on the Orthoptera, Diptera, Lepidoptera and Coleoptera, as well as some on miscellaneous insects. Before we give you another unit on the Hymenoptera it would be well to consider the bugs, Hemiptera. This probably will be your next insect insert.

For supplementary reading to this article I should refer you to a few volumes of my 4-shelf library on insects. Most interesting of these to my readers I am sure are these:



CUCKOO WASP

TRYPOXYLON WASP

GOLDEN DIGGER WASP

MASON WASP

Hingston, R.W.G., *Instinct and Intelligence*, The Macmillan Company, New York. 1929, 296 pages.

Comstock, John Henry, *An Introduction to Entomology*, The Comstock Publishing Company, Ithaca, New York, 1933, 1044 pages.

Duncan, Carl D., *A Contribution to the Biology of North American Vespine Wasps*, Stanford University Publications, Stanford University Press, Stanford University, California, 1939, 272 pages.

Craighead, F. C., *Insect Enemies of Eastern Forests*, U.S. Dept. of Agriculture, Miscellaneous Publication Number 657, Washington, D.C., 1950. 679 pages.

Lutz, Frank E., *Fieldbook of Insects*, G. P. Putnam's Sons, New York City, 1921. 562 pages.

Metcalf, C. L., and W. P. Flint. *Destructive and Useful Insects, Their Habits and Control*, McGraw-Hill Book Company, New York City, 1951. 1071 pages.

Root, A. I. and E. R., *The ABC and XYZ of Bee Culture*. The A. I. Root Company, Medina, Ohio. 1929. 815 pages.

Sweetman, Harvey L. *The Biological Control of Insects*, Comstock Publishing Company, Ithaca, New York. 1936. 461 pages.

Teale, Edwin Way, *The Golden Throng, A Book About Bees*, Dodd, Mead and Company, New York City. 1940. 208 pages.

Wheeler, Henry Morton. *Foibles of Insects and Men*. Alfred A. Knopf, New York, N.Y. 1928. 217 pages.

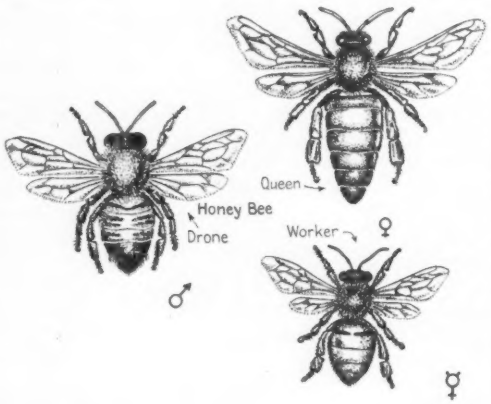
One could write an equally helpful bibliography and omit every reference just given, so rich is the general literature on this subject. However the best source of information is the insect itself, and there are few persons who read this who cannot in a few minutes see a live, free hymenopteran flying or running about in the neighborhood. Read Hingston or Comstock, Lutz, Teale, Fabre or Wheeler to get the spirit of investigation these writers can give you, and then set off on your own. For the benefit of those who need some more starting experience we

write a bit more by way of introduction here.

Imagine a stack of straw with thousands of free ends of straw pointing in all directions. To you they all look practically alike. Imagine an insect that has selected the free end of one of these pieces of straw for its nesting site. Into this free end it must insert a number of spiders it has captured and paralyzed. Other wasps are doing the same thing with other straws in the stack, and yet our friend must come back to its own particular straw to profit by its previous trips. Can you deny this insect any memory? When our flying friend comes back to its slender straw home it may find the entrance guarded by its mate. The gentleman of the family is the one that stays home while the lady brings home the spider. Does the male guard the home, or does he seek only conjugal bliss from his mate, or what is it all about, anyway? Finally the straw filled with spiders gets an extra deposit in the form of a fertilized egg laid by the wandering wasp. The spiders cannot eat the egg because they have been paralyzed just enough so that they can neither die nor become active. So the wasp egg hatches and the larvae eat the helpless spiders.

FIG WASP

MOSSY ROSE-GALL WASP



Is this act interesting enough to hold your attention? Then let us ask you a few more questions. Is this wasp useful or injurious? Obviously it destroys spiders but are the spiders good or bad? Sure, they eat insects, but are the insects good or bad? The insects eat plants, in all probability, but are the plants weeds or cultivated plants? Anyone who can glibly pass judgment in such a situation and defend it should be asked to write an elementary science text, or lecture profoundly to a group of eager teachers. Really it is more fun to know that there is no answer than to be able to give the answer, but that is not what the test writers want. In one doctorate thesis we find third grade children eruditely deciding whether, when one insect eats another, it is harmful or injurious, so of course the teacher of teachers who prepared the test and the teacher of teachers of teachers who approved the thesis should have the answer. Otherwise how could one get data with which to draw conclusions? This is just as absurd as many attempts to pin Nature down. It makes life interesting. For further help along this line read "The Dry-rot of Academic Biology" by William Morton Wheeler in his *Foibles of Insects and Men* and you will know what I mean. It should be required reading of every teacher in school, and of every voter in election. It should start you off on a hobby with hymenopterous insects that should last you a lifetime. Even if you should end up in jail you still could have an interesting time with the ants that would visit you, or with the wasps that lay their eggs in the clusters of eggs laid by the cockroaches that might visit you. Given the freedom of the outdoors your possibilities would be boundless. And yet there are those who see none of these things. Surely the world is a funny place in which to live.

LEAF-CUTTER BEE

LARGE CARPENTER BEE

The little wasp about which we started this argument is *Trypoxylon*, elaborated on in the table in this insert. If you will read some of the other columns you will find that there are some other wasps that paralyze creatures to provide food for their larvae. On the School Page of *Nature Magazine* for October, 1947, I told you of an experience I once had with one of my classes and a group of golden digger wasps (see tabular matter of this insert). I told you how we fooled one of these wasps for 59 times when the published record had been 29. We knew that the wasp must behave in a definite pattern. After bringing its prey to its burrow it leaves it with the head near the burrow and goes underground. It returns to the surface ready to take the hopper below, but in the meantime we had reversed the position of the grasshopper. The wasp then turned it to the original position. Instead of taking it underground immediately it goes under to make an investigation. At this point we turn the hopper again. This we continued for 59 times and might have gone longer had not a student been slow to make the change. Maybe you can better our record. Fabre, the French entomologist, tried a similar trick with a cicada killer, but did not exceed the 40 figure. Let me know what your record is if you do not mind.

It is with these behavior patterns and their interpretation that Major Hingston dealt when he wrote his book on *Instinct and Intelligence*, which I deliberately put down as my first recommended reference. If you liked Hingston's book dealing with insects you might also

like Ruth Crosby Noble's *The Nature of the Beast*, (Doubleday, Doran and Company) which gives us similar information about the behavior of the vertebrates other than man. Both of these books in my library are justly well-worn.

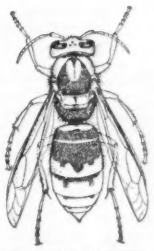
The group of insects with which we here deal may certainly be considered dynamic if we seek reference to them in general literature and sayings. Listen to these and you will see what I mean. Possibly we need a few of these as slogans in these days when so many persons are trying to get out of work. For my own part I am currently retiring from university work so that I can get time to do more work. But back to our sayings. Here they are.

"Go to the ant thou sluggard. Consider her ways and be wise." "What's good for the bee is good for the hive." "How doth the little busy bee improve each shining hour." "He has bees in his bonnet." "Dead bees make no honey." "Stir up a hornet nest."

Surely in these days we could not expect such phrases to be adopted as slogans by any group interested in work stoppage, strikes or slow downs. Maybe they are out the window in this modern day of mass production, machine production lines and so on. For some of us, however, they hold a pleasant nostalgia. Ants are not wholly insane even though they may sometimes appear to be so. I wonder how many "Busy Bee" restaurants there are in the world? And how appropriate it was in World War II that certain vessels were named "Hornet" and "Wasp." I find it difficult if not impossible to find lethargy associated with any member of the Hymenoptera. They just do not go together.

This diligent activity in the hymenopterous insects cannot be associated with lack of intelligence because all the evidence we have points to the assumption that the group includes the most intelligent of the insects.

Of course the Hymenoptera include insects of radically different types. We have some that eat plants while others prefer animal food. For the most part they are rather specific in their food preferences. A reasonable check on the golden digger wasps near my home showed that they stocked their burrows with 90 percent of cone-headed grasshoppers, in spite of the fact that other species were abundant in their range. They must have had the ability to make some selection to produce this record for the enlightenment of scientists.

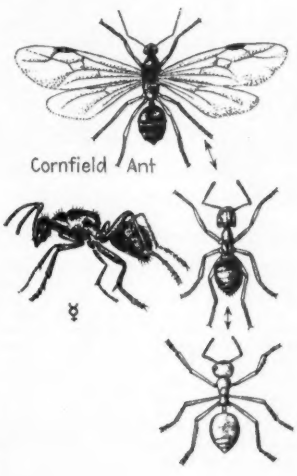


GREAT HORNET

YELLOW JACKET

TARANTULA HAWK

VELVET ANT



The habit of some members of the group to develop individuals with specific functions to perform, of controlling the number of different types produced, and of integrating the efforts of many for the good of the group is truly remarkable in organisms so primitive in some ways.

Those who are interested in food chains, and in interrelationships of organisms, will find many profitable lifetimes of investigation before them if they begin to concentrate on these animals.

We are inclined to suspect that emotion is associated with intelligence. Possibly sounds are reasonable expressions of emotion. If so we can read much into the sounds produced by hymenoptera. There is a vast difference between the contented humming of bees at their usual work, the excited humming of the same bees when they are swarming, and the equally exciting sounds they produce when their hives are being rifled by some intruder. The violin number, "The Flight of the Bumblebee," gives us some evidence that at least one musician tried to record variations in sounds produced by bees. It would seem difficult, however, to distinguish through this number whether reference was being made to sound of bees or of flies, but that is a small matter. Obviously the sounds in both groups are made by almost totally different methods than were suggested when we considered the orthoptera.

Of course bees fly by violently vibrating their wings. We have been told that engineers have said that with wings of the type we find on bees that the animals theoretically could not be expected to maintain flight. There seems to be some evidence that in this case there is some conflict between theory and fact.

In the tables we make some reference to the economic importance of some hymenoptera. The production of honey and of wax by honey bees is obvious, and statistics are provided in the table. Most of us, however, overlook the fact that probably bees and wasps are of as much value as pollinators of fruit trees as the bees are as producers of honey and wax.

The pollination story is extraordinarily involved, as you will see if you read the data given on the fig wasp, for example. When I was in New Zealand a few years ago they were seeking an American entomologist to come down to help them (Continued on page 368)

NAME SCIENTIFIC NAME	YELLOW JACKET *Vespula maculifrons* and *V. vulgaris*	GREAT HORNET. EUROPEAN HORNET *Vespa crabo*	MASON WASP. JUG WASP. POTTER WASP. *Eumenes fraternus*	CICADA KILLER *Sphecius speciosus*
DESCRIPTION	Length about ¾-inch. Yellow and black with only slight differences in pattern between queens, workers and males. Queens the largest of the three castes. Of two recognized groups of species in North America, this belongs to the *vulgaris* not the *rufa* group.	Length, to nearly 1 inch (22 mm.) being our largest hornet. Yellow, black and brown. Head swollen behind the compound eyes, but this character is less conspicuous in the male than in the queen or worker. This character not always so conspicuous in other species. Three castes — queen, worker, and male — are present.	Length, about ¾-inch. Slender-waisted wasps with abdomen swollen to rear. Head not expanded behind eyes. Eyes almost entirely cover the cheeks. There is no worker caste in these wasps comparable to what was found in the hornets and bees and ants. This is not a social wasp.	Length to 2 inches. Yellow and black or rusty, the yellow being in interrupted bands. Has spiny legs that help in digging burrows. Wings are yellowish-brown and legs yellow. Compound eyes cover most of front of face.
RANGE AND RELATIONSHIP	Family Vespidae. Genus *Vespula* represented in United States by 19 species. *V. maculifrons* ranges eastern United States in Lower Austral and Transition zones from Atlantic west to Texas, Nebraska, Kansas and South Dakota. *V. vulgaris* Alaska to New Zealand.	Family Vespidae. This species, the only one in the genus found in America, was introduced near New York City but now widely established. Some 27 genera in the family in North America, including mud daubers, paper wasps, solitary wasps, digger wasps and others.	Family Vespidae, Subfamily Eumeninae, which includes 18 of the families' genera. There are 18 species of *Eumenes* in the United States with *E. fraternus* ranging from the Atlantic west to Texas, Oklahome, Kansas, Nebraska and Minnesota and extending north into Ontario. Others westward.	Family Sphecidae with 84 genera in United States. Genus *Sphecius* includes 4 species. *S. speciosus* ranges through United States east of the Rockies into Mexico in Upper and Lower Austral Zones, with other closely related species extending range to Pacific Coast.
REPRODUCTION	Fertile wintering queen establishes colony nest underground in paper cone in spring. Workers produced first. These enlarge nest and care for brood. Males and queens produced March in California and May in New York and on through summer. Queens mate immediately and go into hiding.	Fertile female in spring builds in hollow tree, or under a porch or roof, a brown or yellow, (not gray) paper nest in which are developed workers that increase size of nest and care for young that develop from the queen's eggs. Workers are stimulated to feed young by material from the young.	Fertile female builds on a twig commonly a small mud jug. In this she places the paralyzed larvae of moths. She then deposits an egg, closes the jug and may build another. Larva feeds on paralyzed caterpillars, at first cautiously then vigorously, pupates, escapes, mates and lays eggs.	Adults appear in late summer and female digs burrow to 18 inches deep ending in 1½-inch chamber. In this female leaves 1-2 paralyzed cicadas with her egg. With 2 cicadas, cells yield larger females. Egg hatches in 2-3 days and larva lasts 2-3 weeks before entering winter cell. Pupates for 2-3 weeks in June or July.
ECOLOGY	Commonly seen at picnics feeding on sweets or on flowers gathering nectar, although they eat other insects as well. Flower visitors commonly males. Males develop from infertile eggs. Colony stays in nest at night or during unfavorable weather, and may best be destroyed then.	Males are developed in late season and after mating die with the workers with cold weather. Queens winter over and start new colony in spring. Gray paper nests in trees or under shelters are probably made by gray hornet, *Vespula maculata*. Feeds on insects but apparently may eat bark.	Some relatives build cemented burrows under ground rather than the attractive jugs on twigs. Some build small masonry turrets. Egg usually hung by thread from ceiling of jug interior. One African species has larva fed by mother who deposits caterpillars in jug as needed, although these are first paralyzed.	Adult female always takes cicada into burrow head first. Fabre fooled insect by turning a cicada 40 times while underground investigation was made. Burrow may have branches and different cells. A number of species of cicadas are parasitized. Cicadae usually give cry when attacked by wasp.
ECONOMY	Probably useful as insect destroyers but dangerous to some persons because of stings, and may injure domestic animals. One teacup of carbon disulfide or carbon tetrachloride dumped into nest and covered with earth destroys colony. Derris powder is also recommended. See Duncan reference.	Useful as insect destroyers but dangerous to men and animals that disturb colony. In getting bark of lilac, birch, ornamental box and other woody plants may girdle and kill plants. Control by benzol, or chloroform, or fire, destroying colony put into garbage can when colony is all home.	Undoubtedly useful as destroyers of harmful caterpillars if the caterpillars are feeding on useful plants but not useful if the caterpillars feed on undesired weeds. Take your choice. Never too abundant and most interesting. Fabre watched larvae through window in jug.	Obviously a useful wasp that destroys cicadas, which are injurious to trees and useful shrubs, so it is worthy of every protection. Burrows are usually found in sunny roadside embankments where soil is loose and deep.

GOLDEN DIGGER *Sphex ichneumoneus*	TRYPOXYLON *Trypoxylon frigidum*	CUCKOO WASP *Chrysis parvula*	FIG WASP *Blastophaga psenes*	MOSSY ROSE-GALL WASP *Diplolepis rosae*
Length of head and body about 1 inch. Slender abdomen at waist but normal to rear. Abdomen darkened to rear but yellowish forward. Thorax brown to reddish-brown and lighter than black rear of abdomen. Wings pale dusky-brown. No worker caste in this group; only males and females.	Length about 1/3-inch. Abdomen relatively slender but widest to the rear, the greatest diameter about equalling that of the thorax. Compound eyes unusually large. No workers, and males and females may work cooperatively in preparing for the next generation.	Total length to about ½ inch. Most cuckoo wasps are metallic green. Abdomen shows in most species only 3 to 5 segments and so constructed that the body can roll into a ball leaving only wings exposed. Segments of antennae of both sexes, 13. Egg-laying tube is extensible and jointed.	Length: females about 1/10-inch, winged, with large eyes, straight, stout abdomen and antennae longer than the head. Males longer but apparently shorter because abdomen is usually held under body so as to extend beyond head. Sometimes wingless, with smaller eyes and antennae.	Length about 1/5-inch. and obviously too minute for superficial observation by layman. Characters are indicated in figure. Most easily studied through galls, which appear as weak-spined red and green balls on stems of sweet briar rose. Galls ½-inch in diameter and persist through the year.
Family Sphecidae with 84 genera listed for the United States. In the genus *Sphex* we have 10 species. Some literature lists *Sphex* as *Chlorion*, but this would increase the number of species considered considerably. *S. ichneumoneus* ranges throughout the United States and much of Canada.	Family Sphecidae with 84 genera represented in the United States. In the genus 27 species in the area. Range of this species is from Hudson Bay to North Carolina and west to New Mexico and Washington, with closely related species extending range to cover the whole country.	Family Chrysididae in which there are in North America at least 9 genera and in the genus *Chrysis* over 60 species. *C. parvula* ranges from the Rockies east in both the United States and Canada. The species has 9 synonyms in entomological literature.	Family Chalcididae, most of which are parasitic on other insects while this species and the joint worm feed on plants. Does not reproduce in the edible fig but in the caprifig, which is grown to produce fig wasps that pollinate the edible Smyrna fig. Native of Asia Minor but established in America.	Family Cynipidae includes in United States about 65 genera. Genus *Diplolepis* appears as synonym of *Rhodites* or *Hololexis* and includes 50 species and subspecies. *D. rosae* is found from Quebec to Virginia and west to Kansas with related species extending range through the country.
Males have rusty tufts beneath last 2 abdominal segments that are lacking in females. Female brings paralyzed grasshoppers to entrance of 5-13-inch burrow and to chamber stocked with to 4 grasshoppers. Lays egg or eggs. Larvae eat grasshoppers or brother larvae, pupate and emerge.	Nests in hollow stems of woody or herbaceous plants, or in abandoned beetle burrows. A related species was observed to have males and females cooperating in stocking hollow stems in a straw stack with paralyzed spiders. Cocoon is long and slender and slightly enlarged forward.	A female *C. parvula* uses as its host the yellow mud-dauber wasp, *Sceliphron cementarium*, or the bee, *Hylaeus variifrons*. The cuckoo wasp female watches the bee or wasp building its nest and manages to enter and lay its egg in the area reserved for development of the young host.	Eggs laid in wild fig flowers in hollow twig develop into larvae that produce galls at flower bases. Developed wingless males pierce these galls to fertilize winged females within. Escaping female, covered with pollen of wild fig, flies to Smyrna fig, enters and pollinates flowers causing fruit development.	Adult males and females appear April to July and mate, and female lays eggs in a few days on stem of rose-briar. Galls form shortly with hard cells representing buds and each housing an individual larva. Larvae mature by autumn but pupae are not formed until following spring. One brood.
Grasshoppers taken in head-first after exploratory trip. If grasshopper is turned while wasp is underground it will go under, come up, turn grasshopper and take it under only when it finds it facing hole. Larva is parasitized by 3 flies and a wasp. Adult may fly 2 miles seeking grasshopper and return.	How individuals could stock single straw stems in a straw stack, putting more than one spider in the same straw, is difficult to understand without attributing memory to the animals. Male may cooperate by guarding nest while female is away after spider for food. A bit ultra modern.	Battles between the cuckoo wasp and its hosts often happen in which the wasp curls into a hard ball which its larger enemy finds difficult to sting effectively. The cuckoo wasp larva may destroy its host by eating the host larvae or eating its stored food, causing starvation.	Figs with mature fruits from wild figs are hung near Smyrna fig flowers which wasps enter. Wasps lay eggs in wild fig but not in Smyrna fig but pollination is effected and palatability of fig and commercial value is increased tremendously. Industry almost destroyed by wasps introducing a rot but this is corrected.	Females may reproduce without mating (parthenogenetically). Pupal stage in spring is short and immediately precedes release of adults from the gall. There is no "alternation of generations." Single galls produce adults of both sexes but single cells of gall yield but one individual.
Obviously useful as destroyer of grasshoppers that destroy useful plants. Live in colonies but not interdependent. Female may dig to 10 holes but usually 2-3 and 70% of holes within 15 feet of home hole of individual. Active in New York from July to mid-September. See *Nature Mag.* vol. 40, p. 438.	Again we have a difficult story to evaluate. The wasps kill spiders that may kill insects that may kill plants that may be useful or undesired. You must take your chances on forming a conclusion if you want to defend yourself. Important note here is cooperation of male and female.	Usefulness difficult to establish. The cuckoo wasp destroys mud dauber wasps that destroy spiders that destroy flies, which may be useful or injurious. Make your own decision in the matter. Again this proves the wisdom of reserved judgment.	Fig industry important and dependent on economic entomology to solve pollination problem and to produce wasps free from rot disease. To do this, wasps are reared in sterile incubators and freed in orchards that are free from the rot. Possibly one of the more interesting of all the interesting wasp stories.	Of little economic importance, but seems to attract wide attention on part of amateur naturalists. Usually larvae are too small to be seen by usual examination with the naked eye or even with the hand lens.

NAME SCIENTIFIC NAME	ICHNEUMON FLY, OPHION *Ophion slossonae*	ICHNEUMON-FLY, PELECINUS *Pelecinus polyturator*	ENSIGN-FLY *Evania appendigaster*	TARANTULA HAWK *Pepsis formosa*
DESCRIPTION	Length of body about 1 inch. Yellow bodied with abdomen increasingly large to the rear and arched upward. Antennae slender and about the length of the body. Wings held erect or nearly so. Lacks the long ovipositor of the females of many other of the larger ichneumon flies.	Length, extended about 3 inches, of which at least 2/3 is in the female the slender-jointed, downward-hooked abdomen. Abdomen of male is about 2 times the length of the head and thorax, while that of the female is about 5 times that length. Wings are held erect over back. Males rare in our range. Females often relatively common.	Length from front of head to rear of abdomen about 3/8 inch but of extended insect to around 3/4-inch. Abdomen with slender base attached peculiarly, as shown in sketch, and appearing somewhat as an afterthought, and ovipositor hardly shows. Hind wings show no closed cells in the veining. Black or red and black. Abdomen compressed.	Body and head to 1 1/4-inches long. Rather slender, with abdomen arched and capable of being bent beneath body. There are no workers, only males and females. A photograph and behavior description is found on page 34, volume 21, of *Nature Magazine*. Appears to be black.
RANGE AND RELATIONSHIP	Family Ichneumonidae, a large family both in genera and species. Genus *Ophion* represented in America by 14 species of which *O. slossonae* ranges from Atlantic west to 100 meridian in Transition and Upper Austral zones. Other species extend range across continent and south to Argentina.	Family Pelecinidae one genus in the family, which in North America is represented by this one species. It is found south into South America, where the male is common. Ranges from Massachusetts to Minnesota and south to Argentina. Individuals of the species may vary greatly from others of the same species.	Family Evaniidae, has well marked anal lobe in hind wing. Only one species in the genus. Ranges through the southeastern United States and north to New York, particularly in cities, where its host cockroaches are in abundance. Also found in Arizona and in the tropics where cockroaches are more abundant.	Family Pompilidae, of which there are 33 genera represented in the United States. In the genus *Pepsis* we have 19 species, most of which are found in our Southwest. *P. formosa* ranges from Texas to Kansas and west into Arizona and Nevada. Found usually in drier areas.
REPRODUCTION	Egg of this species laid in caterpillar of the moth *Acronycta*, a noctuid moth. Some related species parasitize other moths, some attacking caterpillars of large native silkworm moths. Usually one egg laid to a larva. Larva does not kill host until time of pupation, then builds own cocoon within that of host.	Female probes with her long abdomen into the soil until she finds the larva of a May-beetle. In this she lays her egg, which develops as a body parasite Details of the life history seem to be relatively obscure, or at least not common in entomological literature.	Eggs are laid in the egg masses of cockroaches, particularly species of *Periplaneta* and *Blatta orientalis;* in fact the whole family is parasitic on the eggs of cockroaches. Since the cockroaches are common in dwellings it is only natural that their enemies the ensign-flies should be found there.	Fertile female seeks large spider such as tarantula. Attacks and stings it, although it may be killed in effort. If successful, drags paralyzed spider to burrow, deposits egg on spider and leaves the grub with a fresh supply of animal matter for food. Pupal and adult stages follow.
ECOLOGY	Particular moths parasitized by this species are known as "daggers" some of which destroy elms and basswoods. The moths are mostly night flying, and many of the species of *Ophion* are night flying as well. Some of the ichneumon flies lay but one egg while others lay many eggs on a single larva.	While the insects look as though they might be dangerous to man they are wholly harmless, and because of their destruction of May-fly larvae that destroy our tree leaves and our grass roots are highly useful.	Some authors use the name ensign-flies, while others use the term ensign wasps. Technically the latter is, of course, the more correct. There is no worker caste among these wasps, and they are not social as are some other groups.	Fights between tarantulas and tarantula hawks appear relatively frequently in native stories. Tarantula hawks are also called cow killers, as are the velvet ants, although it is doubtful if either ever killed a cow, or any other mammal for that matter. Spiders are the prey, the larger the better.
ECONOMY	Obviously useful as destroyers of insects that are harmful to useful trees. Some ichneumon fly parasites may almost swarm in the body of a caterpillar with some pupating within the larva or within the host's cocoon. In some species one caterpillar may yield over 30 ichneumon flies.	Usefulness has already been discussed in connection with description of habits. Extended observations of a careful nature are needed.	Obviously useful to man as destroyers and no doubt useful checks on the multiplication of harmful cockroaches. Because of this are worthy of every possible encouragement. This situation should warrant a more general understanding of these insects, to the end that through ignorance they may not be destroyed.	If you do not like tarantulas that kill harmful insects you can classify the tarantual hawk as a useful insect. Even if the insects destroyed by the tarantula are harmful your resentment against spiders may modify your usual good judgment. You may decide whether they are good or bad but be sure.

LEAF-CUTTER BEE *Megachile brevis*	HONEYBEE *Apis mellifica*	LARGE CARPENTER BEE *Xylocopa virginica*	CORNFIELD ANT *Lasius niger*	VELVET ANT, COW-KILLER *Dasymutilla occidentalis*
Length just under ½ inch. Rather stout bees of moderate size. Female bears pollen brush on under side of abdomen and the tongue is long. Males have lighter faces than the females. Abdomens with light and narrow bands at the segments. No worker caste.	Length of worker or sterile female about ½ inch; of drones and queens ¾ to 1 inch. Queens with conspicuously larger and longer abdomens than workers or drones. A single colony may number to 60,000 individuals mostly workers. Workers live 1-2 months; drones, 1-2 months; queens, several years.	Length to 1 inch. Like large, black bumblebees but female carries on hind legs a large pollen brush of hairs, not a pollen basket such as is found on bumblebees. Lacks yellow of bumblebees and is more shining black. No worker caste in this group and nest building is done by female.	One of commonest small brown ants found in lawns and fields. Queen with conspicuously large abdomen, relatively small head and short antennae, winged at first. Worker with unusually large head strong jaws and relatively long antennae, wingless. Drones winged and smaller than queens.	Length; female under 1 inch; male, over 1 inch. Male silky black and red body with brown wings. Female ant-like and black and red. Females can sting violently but the males cannot. Females run rapidly. Western relatives are yellow and nocturnal. Males of *D. occidentalis* found frequently on flowers.
Family Megachilidae includes 25 genera found in United States. Genus *Megachile* includes 92 species of which *M. brevis* is the type species and often considered under subspecies *Litomegachile*. *M. brevis* ranges from Canada south through United States and on into Mexico.	Family Apidae includes 42 genera. Genus *Apis* includes the one species *mellifica*, which is of Old World origin but introduced and established in the Western Hemisphere. Wild bees are probably German bees var. *mellifica*, while the Italian bee most cultivated is *ligustica* and Caucasian bee *remipes*.	Family Apidae includes 42 genera including honey bees. Genus *Xylocopa* includes 10 species. *X. virginica* ranges from Connecticut to Florida and west to Illinois, Kansas and Texas. Related species extend range to Pacific Coast and some species extend range into South America and the West Indies.	Family Formicidae includes 65 genera found in United States. *Lasius* includes 29 species and subspecies in same area. *L. niger* ranges from Europe and Asia into Alaska and Canada in extreme northern areas, and south to Florida and California. It is found in houses and a variety of outdoor areas.	Family Mutillidae, with 7 genera in North America and in the genus *Dasymutila* 141 species. The species *D. occidentalis* ranges from Connecticut to Florida and west to Texas, Colorado and South Dakota. It is found most commonly in relatively dry areas.
Fertile female builds nest that is lined with leaves of rose or maple usually cut in long oval for sides and circles for ends. Burrow is cut in wood or in natural hollow. Cells stocked with mixture of honey and pollen adequate to feed larva that develops from egg. Pupates in cell.	Drones and queens mate in summer in flight. Fertile queen usually starts new colony with her swarm. Wax combs built by bees or by man hold honey made from flower nectar. Eggs laid in comb become larvae, then pupae, then adults. Egg to queen, 15 days; worker, 21 days; drone, 24 days. Drones from unfertilized eggs.	Females appear in early spring. Dig tunnel in wood with ¼-inch entrance. Tunnel turns upward after entrance is established and extends to 1 foot. Cell partitions of cemented wood chips are put in. Egg laid with food supply of honey and pollen. Winters as larva with short spring pupal stage.	Queens fertilized in fall shed wings and burrow into ground for winter. First summer lays to 200 eggs and rears about 25 workers. Eggs 1/50 inch long. Eggs hatch in 3 weeks into larvae that in 3 weeks mature and form whitish silken cocoon about ⅛ inch long for 3 week stay.	Female *D. occidentalis* uses as host bumblebee *Bombus fraternus*. Egg is placed in bumblebee's nest where it hatches into larva that attacks bumblebee larvae killing some. Larvae preying on smaller insects develop into individuals smaller than those preying on larger insects.
Circular cell caps are cut slightly larger than the diameter of the cavity, so fit tightly. Several cells placed in tunnel end to end and often several bees will build nest close together. There is however no social life represented by the species. Presence of bees indicated by leaf injury often.	Food is pollen and nectar; of larvae, a beebread of pollen and nectar prepared by workers. New queen may develop from queen cells (larger than workers) or from workers not over 3 days old by enlarging cell and changing food from beebread to "royal jelly." Useless drones are killed.	But one brood is developed in a year. Cell divisions show spiral on under side and smooth concavity above. A number of bees may build burrows near each other but there is no colonial adjustment. There are many related Old World forms that are rather well known.	Most active 3-6 P.M. on clear days. No males or virgin females in first year colony. Food: 1st year fed substance of mother who seeks no food, may also eat eggs and other larvae. 2nd year fed food brought by workers increasing colony by about 100 new members. Colonies increase 6 years, of some species 15 years.	To be strictly technical we should say that the velvet ant larvae that attack the pupae are almost mature larvae, destroying them in a few days. Cocoon of velvet ant is spun inside pupa of host. Name cowkiller probably comes from unfounded belief that sting can kill a cow.
Ordinarily not injurious but has been reported common enough in Ohio to injure vegetation, and in Montana in 1932 reached pest proportions. Nests often found in crevices between shingles, in bark crevices or even holes under stones close to the ground. See *Nature Magazine*, Vol. 41, pp. 373-4.	Probably most valuable of all insects because of value of honey and wax. U. S. produces annually about 500 million pounds of honey and 10 million pounds of wax. One pound of honey represents about 20,000 bee trips, each trip averaging 1 mile. Service in pollinating plants equals that of yielding honey.	Ordinarily not injurious but serious damage to wood by borings has been reported in Kansas and Ohio. Related mountain carpenter bee bores in redwood, while others seem to have preferred wood types. Control may be effected by use of derris powder and paint applied to wood.	Ants can survive freezing or 100 F., submergence for a day, decapitation for a month. Queen may lay 100 eggs a day. Harmful to plants carrying aphids to feed on roots of crops. Control by poisons of type that are delayed so as to reach the queen and not kill worker on the way to her.	Probably these insects are not useful since they can sting severely, and also since they apparently prey on bumblebees and other bees that are useful in the pollination of valuable plants.

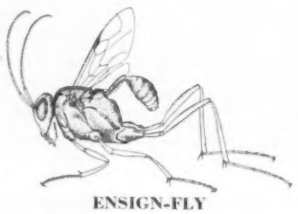
(Continued from page 363)

produce a vigorous bumblebee that had a sufficiently long tongue to pollinate their clover and alfalfa and yet enough persistence to resist the blows they receive from the stamens of these plants when they are disturbed by a probing bee. We may think that it is academic to point out that the length of the tongues of bees may vary. This assumes a different light when we remember that they must get nectar that may be hidden deep in flowers. If they cannot reach it they starve, and if they starve they do no work and we get no clover and alfalfa to feed our domestic stock that feed and clothe us.

CICADA KILLER

ICHNEUMON FLY, OPHION

Most of our domestic animals have been improved by selective breeding. This was relatively simple with groups where the animals may be kept under control. With bees, however, it was not so simple. The mating takes place when the bees are in flight and under these circumstances it is not a simple thing for man to control what happens. A few years ago it was found that the sperms could be taken from a male and put into a female artificially. A small plug kept the sperms in the queen. Then it was found that these sperms of known origin could be taken from the queen and put into another queen. This practically guaranteed what the bee breeders wanted. Sperms of known value could be put in a queen. She could be shipped by mail to any reasonable distance where the sperms could be taken out and put into another female. Control by this technique was practically complete.



ENSIGN-FLY

ICHNEUMON FLY, PELECINUS

We may profitably make a number of studies of the bees, wasps, ants and their relatives from the standpoint of their ability as artisans. Man constructs complicated structures with the help of tools, but these insects, with relatively few exceptions, do all of their work without the help of any tools. Digger wasps have been observed to use a small stone to tamp down the earth over the entrance of a burrow in which has been left a portion of the succeeding generation. This use of a tool may well be evidence of a high degree of intelligence.

But now let us look at the structures these creatures build. When we flatter ourselves that we can make paper we should be humble and recognize that paper wasps made paper nests long before our species did anything of the sort. Even the Russians should recognize their priority claim. These paper wasp houses are well ventilated and yet adequately weather proof. They can be torn down and reconstructed reasonably easily, and so have something on some of our modern man-made dwellings.

Then we have the masons in the group. The mud dauber wasps make nests for the young of the succeeding generation, and the nest of one species may often be easily distinguished from that of another. Then, we have the little jug wasp that builds a beautiful little vase, fills it and seals it without the assistance of any potter's wheel.

The carpenters have their representatives in the group. Some of the carpenters are ants and some of them bees, but whatever they may be they can well be proud of their skill. Imagine a carpenter bee digging its tunnel in solid wood, stocking it with just enough food in each of the rooms to provide for the juvenile needs of its young. Or, again, imagine the skill of a leaf cutter bee that cuts from leaves pieces of at least two patterns, one an oblong to line the cylindrical unit planned for, and then a circular cap to separate the different rooms. Furthermore, these pieces must be of the proper size to fit the tunnel in which they will be placed.

And while we are commenting on the skills of these insects we cannot overlook the air conditioning maintained in the hive of honey bees by circulating air with the help of bee-wing motors. We cannot ignore the wax structures that make up the honeycomb, or the variation in size of nursery cells for insects in a hive whose function in life will be unique. Neither can we forget the diligence of ants, the way in which they carry their larvae and pupae to different parts of the nest burrow to a point where the temperature and humidity conditions are suitable to the best development. Even more remarkable in the ants is the development of different individuals with structures suitable for special service as warriors, stud animals, workers or mothers.

The management of most hymenopterous insects is dependent largely on the use of what we know about their habits. It is futile to kill a few ant members of a huge colony. They are merely replaced by hosts of others.

Without the presence of hymenoptera all sorts of things would happen. We have told you of many, but probably the most important we have not mentioned. This concerns the role they play in controlling other insects. They attack and kill adult insects, lay eggs in the larvae of other insects, destroy the eggs of insects and generally make life miserable for some of their relatives of the animal kingdom. This we will have to tell you about in some other article on the subject.

Gila Wilderness Threatened

AN EXCEEDINGLY DANGEROUS proposal to eliminate an extensive tract of virgin ponderosa pine from the Gila Wilderness Area in New Mexico is facing conservationists this summer, and it seems to us that it should be scrutinized most carefully. The proposal, strangely enough, is not based on any demands from lumbermen, but arises rather from timber-management ambitions within the U. S. Forest Service itself. It comes from sincere but — we feel — misguided foresters, within this great agency, who seem unable to reconcile themselves to the fact that the Gila Wilderness contains so much primeval ponderosa pine that they are able to translate it into half a billion board feet. Having worried for years over the fact that all this "timber" has been "locked up" in this wilderness, these zealous timber-management experts have finally gotten to the place where a regional forester, C. Otto Lindh of Albuquerque, New Mexico, has formally proposed to remove and thus make available for lumbering about a hundred million board feet. It is a situation that may well be duplicated on many other wildernesses being preserved, and must be dealt with in the light of the principles of wilderness preservation involved.

It was here in New Mexico, a quarter of a century and more ago, that Aldo Leopold, Fred Winn, and others first succeeded in having an area of national forest set aside for wilderness preservation — including, of course, its primeval "timber." Thus the Gila, then containing some 693,000 acres, became the type specimen of national forest wildernesses, which now comprise a system of seventy-seven areas. The Gila was first set aside in 1924, by the regional forester. In 1932, when this New Mexico experiment had proved itself, and a system of primitive areas was being established throughout the national forests, it was among those so designated by the Chief of the Forest Service. In this status it has since continued, although a road in the meantime has, indeed, crossed the wilderness, diminishing it and dividing it into two — the 170,000-acre Black Range Primitive Area and the present 563,000-acre Gila Area. The fifth largest, as well as the oldest, the Gila is today one of the most important of all the national forest wildernesses and one of real national significance.

Now, in connection with a commendable plan to have all the wilderness areas reestablished by the Secretary of Agriculture under improved regulations, the Forest Service is onoe more examining the boundaries of the Gila area. Once the boundaries have been thus finally determined, we are assured that the reclassification to be asked from the Secretary of Agriculture will place the area "under a more permanent form of protection."

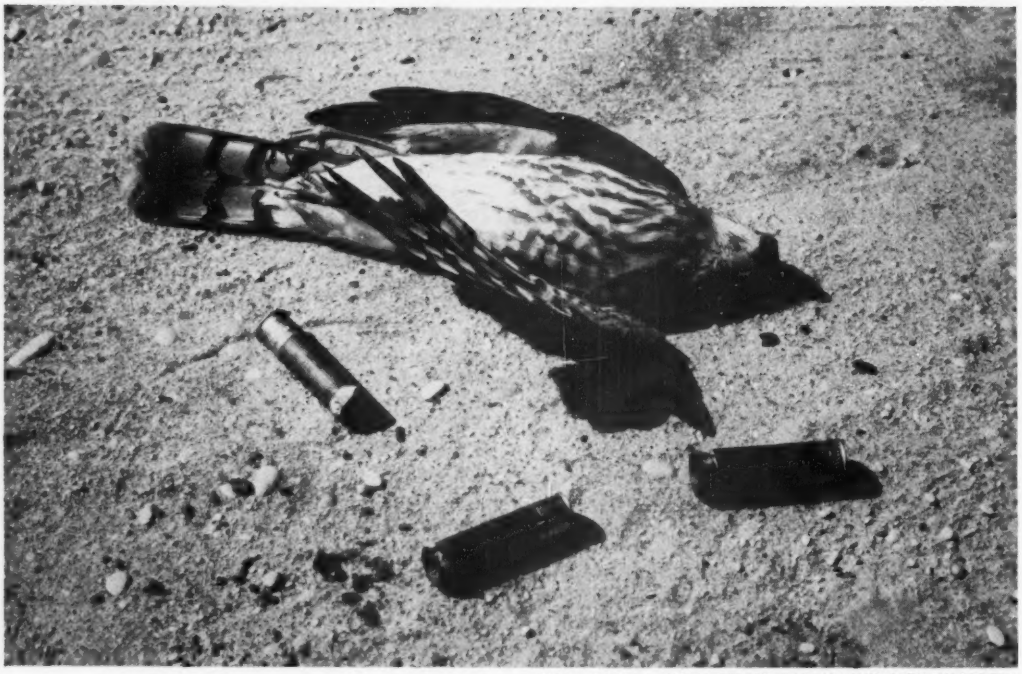
With this general purpose we, of course, find ourselves in general agreement, and, indeed, we concur also in many of the details proposed — even though the wilderness would thus be somewhat reduced in area. We recognize that the wilderness as now established includes extensive private holdings that are not likely ever to be acquired by the government and to which the owners can demand access roads, and that the eastern part of the area has also become invaded by roads and jeep trails that can not readily be eliminated. We recognize the importance of eliminating such intrusions from a well established wilderness and providing for its strict administration along reasonable and effective boundaries. And we note, without protest, that these justifiable eliminations include large areas that can later be lumbered.

But we find two exceptions in our agreement with the Forest Service proposals.

For one thing we question the elimination of the northeastern part of the present wilderness, which includes Indian Creek Canyon and Jordan Canyon. Although we note that this section is shown on the map as proposed for elimination, it appears to be practically free of private holdings, and road and jeep-trail invasions. It might well be reconsidered, we believe, and retained within the wilderness when these eastern and northeastern boundaries are reestablished.

And finally we protest most earnestly against the elimination of a large tract of ponderosa pine on Iron Creek Mesa in the northwestern part of the present wilderness. Here we find a present boundary better as a wilderness border than the proposed one — and no good reason for reducing the wilderness. Even the Regional Forester, in proposing the elimination, admits that "there is very little interest in harvesting timber stands inside the wilderness at this time" and falls back for his own justification on New Mexico's "need" for "more industries to balance its overall economy," arguing that "the harvesting and utilization of timber stands offer important possibilities in that respect." Surely this is timber-management ambition gone wildly astray.

In Silver City, New Mexico, at the headquarters of the Gila National Forest, of which this wilderness area is a part, there will be a hearing, we are informed, on August 7 to consider these proposals. And any who wish to, may write their views to Regional Forester C. Otto Lindh at his headquarters in Albuquerque, New Mexico, at 510 North Second Street, and be confident that their opinions will be considered. We urge all who are interested to write, and particularly we urge upon all the importance of realizing the danger of eliminating an area of national forest wilderness because it includes "timber" that can be cut. There is no telling where such eliminations might stop, and on the other hand there is no reason why we should not preserve some of our tracts of virgin forest even if we might make some money by cutting them.



PHOTOGRAPH BY JOHN K. TERRES FROM NATIONAL AUDUBON SOCIETY

A sharp-shinned hawk, victim of the firing line. "The luckiest of these little migrants," says the author, "dropped dead before us, but off in the brush we could hear the shrill cries of the unlucky — those that were destined to crawl about the woods, maimed and starving."

Cape May's Firing Line

By KATHLEEN GREEN SKELTON

ON THE last week-end of September, 1951, we drove down to Cape May, New Jersey, hoping to see one of Cape May's spectacular hawk flights. Saturday morning we woke to a brisk nor'wester — sure presage of a good flight. On a northwest wind birds migrating south crowd into the funnel of Cape May Point where, faced with the wide expanse of Delaware Bay, they await favorable winds to cross.

The Cape May region has been aptly described as "one of the world's greatest ports of embarkation." The first northwest winds of August bring the tree swallows, thousands of them crowding the telephone wires, or landing like a sheet of raindrops on a lonely stretch of road, iridescent bodies glinting in the sun. September brings a pageant of notable flights — flickers, flycatchers and warblers — and late September brings Cape May's most famous migrants — the hawks, and a few of the earliest of the woodcocks, whose former notorious slaughter figured largely in the establishment of the Witmer Stone Wildlife Sanctuary, named in honor of the famous ornithologist and botanist whose life-long studies were centered in this rich ornithological area.

Along with other bird watchers we piled out of the frame boarding house on the waterfront, that mecca for birds and bird watchers. High overhead hundreds of broad-winged hawks were soaring, their bodies luminous in the sun. In their midst flew one lone sharp-shinned hawk, prophet of coming hundreds. We watched the great company sail out over the bay, tacking into the wind; then prudently they beat their way back to land.

Night migrants had landed with the dawn, and in the garden a brown creeper and a magnolia warbler were feeding. Day migrants were milling busily about, too — bluejays straggling into the treetops and little flocks of cedar waxwings bounding over.

For us the great sport of bird listing had already begun, and we hurried down Cape Avenue with other bird watchers. Cape May Point is an old summer colony with a variety of bird habitats, all on a small scale; there is a miniature lake, a small dune or two, a little fresh water marsh and a patch of woodland. It

is astonishment never ending to walk its sidewalks and see rare birds flitting about as in an aviary.

A wave of sharp-shins followed the broad-wings. In small groups they poured in from the lighthouse, sailing over the woods just across the lake. There some of them fluttered ominously as shots echoed.

Hawk shooting is an old story at Cape May. For years it has been one of the scandals of the ornithological world that flagrant shooting takes place on this great flight line, even within the bounds of the little wildlife sanctuary, still under the nominal control and administration of The New Jersey Audubon Society.

Irresistably drawn to the dark fringe of this woods, we pushed into a clearing fifty feet from the road. There, poised beside a dump heap, and surrounded by dying sharp-shins, stood three gunners. Under New Jersey law the sharp-shinned hawk, is unprotected, and is therefore legal kill. Cape Mayers call the sharp-shinned hawk, the blue darter, for he darts among the treetops where soaring hawks cannot manoeuver.

Flights of robin-size sparrow hawks brought heavy shooting from the firing line.

One by one, the blue darters glided down over the clearing, and one by one they fell, screaming in agony as the shots hit them. The luckiest of these little migrants dropped dead before us, but off in the brush we could hear the shrill cries of the unlucky — those that were destined to crawl about the woods maimed and starving. I asked the ringleader, a big man in a red jacket, if he would not follow the humane code of retrieving and killing his wounded. He laughed and said that I could retrieve them.

One of the others picked up a blue darter with a shattered wing. About the size of a bluejay in his hand, its blue-gray feathers shone in the sun against the rich salmon plumage of its breast. Silently the bird turned its molten amber eyes on the gunner as he raised a stick. At the first blow the little head reeled. The bird cried out, but continued to stare at his persecutor as another and another blow fell. A spot or two of blood appeared on his immaculate feathers.

"This is interminable!" I was surprised to hear my own voice cry out, "I will do it myself!" From a pile of logs I snatched a split stick and crashed it on the quivering body of the little migrant at my feet. At last the beautiful feathers lay still, bedraggled, dead. "Jeez," said one of the gunners, laughing, "I'm glad she didn't swing that at *me*."

After that my companion searched the woods, quietly killing the pathetic little creatures that fluttered helplessly in the bushes. Here was one with eyes shot out, calling, another with leg dangling — it was a moving sight, and I turned back to the clearing, leaving them to him.

One of the gunners wore no license. I asked whether he had a license, and he replied that he did not have to show it to anyone but a game warden. The law states otherwise, but lacking the courage to contest the point, I moved off down the path towards where a concealed gunner was shooting wildly. I called and asked what he was shooting at.

"Cooper's hawk," he called back in some pride, plowing through the underbrush to show me the bird. It was a young broad-winged hawk still alive, a gentle bird, plumaged in soft brown.

"Well, you owe the state $25 on that bird," my companion said, explaining that the broad-wing is a protected species in New Jersey. This gunner, too, wore no license, and by way of explanation he told us, as we walked along the path, that he was in the Coast Guard and needed no license. (Until the signing of the Japanese peace treaty service men in New Jersey had the privilege of shooting without license.)

"What can you do with these dead hawks?" I asked.

"Oh, nothing. They're just targets. But do you realize that they eat other birds?"

"We eat birds, too," I said. "And the blue darter does not kill them for sport." As with other predators, modern ecologists feel that the blue darter carries out a valuable role in Nature, acting as a population check on small birds, and preserving them from disease and pestilence.

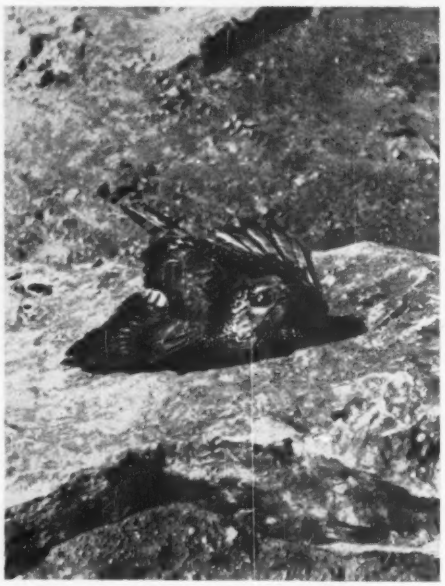
We walked back to the road, past a tumbled pile of blue-gray feathers on which the flies were gathering. Only an hour since these little migrants were sailing with that great company overhead. We looked up at the milling thousands. Most of them were "soaring hawks" — broad-wings, red-tails or red-shoulders — birds that live largely on rodents, snakes and insects, and that, before their numbers were decimated by gunners, kept the farmers' bins free of rats without benefit of government subsidy. Yet poultry killing is the standard excuse for killing them.

Down at the beach, we again ran into the young man in the red jacket with other gunners. When he saw me he called out that he had shot some cripples for me

to retrieve. He stood shooting within a dozen feet of an occupied cabin and within one hundred feet of the road. Under New Jersey law this adds up to two violations — a fact suddenly realized by both of us. I gained sudden respect when I snatched my Leica from the car. The brash young man dashed into the cabin and took off his license. As events proved, he was shooting with a resident New Jersey license, priced $3, although he was a non-resident. (A non-resident license costs $15.)

Several times in the next few hours we ran into this same ringleader with various companions. On no occasion did we see him retrieve his cripples. At length, taking the dead broad-wing as evidence, I went to the mayor of Cape May Point and asked for enforcement of the hunting laws. The mayor said that he could not "get excited" about hawk shooting, and that the territory involved was, in any case, outside his jurisdiction.

An unknown man intervened in this conversation, identifying himself as the head of a local sanctuary that operates in part as a gun club. He was said to be a deputy warden, and I urged him to investigate our complaint. But seizing on the cliche of education he demurred; he was following a policy of being friendly and of "educating" the gunners, he said. Education is a blessing, but to date no one has suggested that schools will enable us to do away with the police force!



PHOTOGRAPH BY R. H. POUGH FROM NATIONAL AUDUBON SOCIETY

A wounded but still living sharp-shinned hawk flutters helplessly on a rock.

With no further heart for hawk flights, yet with one last look at the soaring voyagers of the sky, we drove into town, taking refuge in a movie where, at least, we could get away from the sound of shooting.

From other bird watchers we heard of a great flight of sparrow hawks that afternoon and heavy shooting at Higbee's Beach, a concentration point for falcons taking off across the bay. One gunner boasted that he had shot fifty hawks in three hours. Our friends had innocently pitched a tent on this precarious beach before the shoot!

Sunday morning we visited Higbee's Beach. The wind had changed, and there was no flight, but the dirt road into the beach was littered with shells and an occasional liquor bottle. Following a faint cry, "Killee!" in the woods, we found a little wounded sparrow hawk, smallest and most charming of the falcons. He was shot through one leg and wing.

I picked him up to kill him. About the size of a robin in my hand, he had the barred red breast, the blue wings, the russet crown and black mustaches of an adult male. Indignant and full of fight, he turned his great Egyptian eye upon me. He had the air of taking on all comers, this tiny generalissimo, and he actually tried to peck me! I could not possibly kill him, and we persuaded one of the kind ladies of Cape May Point to care for him until he could fly again. When she released him, he threaded his crooked flight into the apple tree on the lawn, disappearing with the last wave of migrant sparrow hawks. Farewell, little voyager, on your perilous crossing! May all the winds be favorable, and may there be no gunfire on the landing beaches!

The sparrow hawk is a protected species. In the same woods we found several dead sparrow hawks and a dead osprey, also a protected species. Skulking silently in the brush were several crippled blue darters, pathetically creeping into hiding from us. We killed these sad little birds.

In short, in the space of a few hours, we had found three protected species shot, and witnessed several violations. Taking one each of the protected species, we called on the State game warden at Stone Harbor, a genial soul who said he had been at Higbee's Beach during the falcon flight, but had not seen any protected species shot. When I told him I would send a report, he said, laughing, that he would probably have to file it in the fireplace!

But from Cape May people themselves we encountered much sympathy. Much of the shooting was done, they said, by gunners from outside the Cape May area. The newspaper editor and the president of the Cape May Chamber of Commerce pointed out that there was an economic factor involved — the money that bird watchers bring in out of season. The previous weekend there had been a gathering of 750 bird watchers, and the Chamber of Commerce hoped to promote this as an annual affair. Ironically, most of these birders did not know of the hawk shooting; in the absence of a northwest wind there was no hawk flight, and, as a further precaution, the State game warden is reported to have asked gunners to desist from shooting during that weekend!

The editor suggested that township authorities might be prevailed upon to create an effective sanctuary in the area where the migrants concentrate — in short in the whole area south of the Cape May Canal — by

Broad-winged hawks are protected in the State of New Jersey, but this legal championship means little to the hawk shooters on the Cape May firing line when broad-wings pour over in migratory waves.

PHOTOGRAPH BY
FRANK AND JOHN CRAIGHEAD

the establishment of no shooting zones. In a lead editorial of October 11, 1951, "Are We Killing The Golden Goose?" he wrote, *"With growing numbers of bird watchers becoming increasingly important to Cape May, it seems inevitable that local interests will soon sparkplug an attempt not only to curtail indiscriminate shooting but to outlaw it entirely."*

Hawks, I learned, have become a popular issue in the ornithological world. Several bird clubs, including that august body, The American Ornithologist's Union, passed resolutions condemning hawk shooting and recommending the establishment of a sanctuary in the area south of the canal. Through the efforts of the Emergency Conservation Committee the sanctuary project and illegal hawk shooting were well publicized. Thousands of protests poured in on The New Jersey Division of Fish and Game, whose Director at length issued a mimeographed statement on the subject. The young man in the red jacket was fined for shooting with an improper license, and special wardens were promised for the Cape May area.

Letters also poured in on the Chamber of Commerce, whose president expressed much interest in that hidden potential, an army of bird watchers who stalk with binoculars and camera, bringing out-of-season business to hotels and inns. Many municipalities have protected large concentrations of birds by no shooting ordinances, and used them as a tourist attraction. One such now famous sanctuary is Oakland, California, host to the migrant ducks of the Pacific flyway, and to thousands of human migrants who flock to see them.

Thus considerable headway has been made with the sanctuary project, but its progress has been impeded by confusion among conservationists themselves. As in other efforts, our fight has been characterized by many tangents and much misinformation.

It was said that no shooting ordinances would interfere with a man's hunting rights on his own property. In our country no citizen has any inherent right to the wildlife on his property. All wildlife is the property of the State, the privilege, the method and the amount of the kill being determined by the State. There is, fortunately, little game south of the Cape May Canal, and should it be necessary, the ordinances could be limited in duration to the migration season, which ends about the time of the opening of the hunting season. One of the townships involved already has a no-shooting ordinance.

Although a township cannot directly protect wildlife, it can restrict shooting on grounds of public safety, and thus indirectly protect wildlife. In Cape May the no-shooting ordinances would serve the dual purpose of protecting hawks and incidentally bird watchers, two of whom were precariously camped on Higbee's Beach during the shoot. Township ordinances can be enforced by State and local police.

Another effort to solve the hawk shooting dilemma was the introduction of a hawk bill by the largest conservation society in the State. The hawk bill seemed a splendid project, in no way incompatible, of course, with a local sanctuary. Yet its progress was starred by confusion. After the bill was introduced in January, some bird clubs did not know of its introduction and so failed to lobby for the bill. One of the directors of the society addressed the Cape May Chamber of Commerce, urging them to support a hawk bill rather than a sanctuary, while at the same time the members of the society (which had voted to support a sanctuary effort) were still working toward a sanctuary!

It seemed a tragedy when the hawk bill failed by the narrow margin of two votes. Yet thorough analysis suggests a silver lining. Unlike the Connecticut and Ohio laws, this bill would have recognized "vermin" licensees, and *would have permitted them to shoot any hawk or owl all the year round.* Any conservation society should, on principle, oppose vermin permits. The very word, "vermin" is a denial of their basic philosophy that each species has its place in the scheme of Nature.

Since vermin licenses are issued at the discretion of local wardens, hawk shooters (Continued on page 383)

"Wheel Chair Naturalist" Becomes Research Worker

By CHARLOTTE HILTON GREEN

Photographs by Barringer Studio

Dr. G. S. Taylor, Jr., orthopedic surgeon; Evelyn Hendricks; Dr. Maurice Whittinghill, University of North Carolina geneticist, and Dr. R. Ruggles Gates, Harvard University geneticist, photographed just before starting on a tour in their arthritis research study.

DO YOU remember Evelyn Hendricks, wheel chair naturalist? She was featured in *Nature Magazine*, October 1945.

Briefly, Evelyn at thirteen was stricken with arthritis; at fourteen she was on crutches; at the end of her sophomore year she had to drop out of high school, and by the time her classmates graduated she was confined to a wheel chair, practically helpless.

Today, in her mid-thirties, still a wheel chair invalid, she is largely self-educated; a writer, artist, naturalist and brilliant conversationalist. In September, 1951, as a result of a project *she herself initiated* she was named research assistant to Dr. Maurice Whittinghill, geneticist of the University of North Carolina.

As such, Evelyn Hendricks of Nashville, N.C., will collaborate with Dr. Whittinghill, who has received a grand-in-aid from the U.S. Public Health Service for a study to determine the influence of heredity on arthritis. When completed, it will be written up in collaboration with Dr. Robert M. Stecher, of the City Hospital of Cleveland, an authority on arthritis and rheumatoid diseases.

For new readers of *Nature Magazine*, I will give a brief resume of Evelyn's life and work. She had long been interested in the out-of-doors, and a friend used to drop off the school bus, two or three times a week, to take her "rambling afield." Often neighborhood children would accompany them, helping lift chair and Evelyn over fences, ditches, across creeks. She was a keen observer, and kept notes.

Interested in my own column, "Out-of-Doors in Carolina," Evelyn decided to write one of her own, "Time to Ramble," which appeared for a couple years in a county paper. An early project was the making of a survey of the wild plant life of her community, and she and the friend who pushed the wheel chair identified more than 500 native species.

For years she had wanted to sketch and paint wild flowers, and since no teachers were available, started to teach herself. Although both hands are crippled, the right one became worse, so she taught herself — a long, slow process — to use her left hand. Later she was given a Vocational Rehabilitation grant for a term at the Summer School of Duke University, where she made an A grade. Although her main interest and work was in the Herbarium, she had a few art lessons, and a painting of her *magnolias* was hung in Duke Hospital.

Evelyn taught herself to use a typewriter, learning on a brother's old portable; today she has an electric one, presented by an admiring but anonymous friend. She hits the keys with a rubber-tipped pencil, and her files contain hundreds of well-typed papers, neatly done case-histories, charts and reports, all a part of her research project.

In 1947, as a guest observer, Evelyn attended the North Carolina School for Crippled Children, which was held in Chapel Hill, seat of the University of North Carolina. This opened up a whole new line of inquiry and activity, giving new impetus to her life; she attended lectures on anatomy and orthopedics, having recently acquired an interest in arthritis, the cause and cure of which is as yet unknown. Reading articles on medical

Evelyn Hendricks is presented with an IBM electric typewriter. With her are Robert B. Hawkins, district supervisor of Vocational Rehabilitation, and M. E. Johnson, representing International Business Machines.

research she learned to identify the type she has, rheumatoid, which is called "the great crippler" due to its destructive effects on the joints. Never before had she taken an interest in arthritis, being reluctant to talk about her own illness. Now, with a definite purpose in mind, she tried to learn everything she could about the rheumatic diseases. Quickly she developed an intensive interest in research and a fervent wish to be able to make some contribution to this new field of inquiry.

She delved into anatomy, genetics, allergies and psychology. Widening the scope of her interests, she wrote to eminent physicians, authors of textbooks, medical foundations, asking if there were any way in which she could make a contribution to research, offering to be of service in any way possible, writing case-histories, making pedigrees — even to being a "guinea pig" for research and experimentation. She had found, she wrote, that there was a surprising incidence of the crippling diseases among her own kinfold; in five large, inter-related families. Did that have any significance?

To their credit be it said, the various doctors, specialists and authors answered her letters. The first physician to answer, Dr. O. C. Wenger, of Hot Springs, Arkansas, suggested, "even a person who is handicapped physically can help the cause along. Why not try your hand at writing your own medical history? Go into details, just as we ask our patients to do. Perhaps your experience and that of others may help us to solve the riddle of arthritis."

Other doctors answered her letters, giving helpful suggestions, comments, offers of assistance. Dr. Walter Bauer of Massachusetts General Hospital expressed an interest in the first pedigrees she made, encouraged her to continue working, and endorsed her project when she began looking for funds.

At Duke Hospital, where she had been a patient, she discussed this research with orthopedic surgeons, psychiatrists, allergists and other specialists, who not only gave her suggestions and advice, but generously contributed X-rays, physical examinations and psychological tests for certain patients listed in the studies. Her personal physician, Dr. James P. Hendrix, assisted her in obtaining medical data from ten different hospitals, always having the written permission of the patients involved.

Although it is rare, children sometimes have arthritis, a type known as Still's Disease, which Evelyn herself had at the age of three, and naturally she is particularly interested in helping child victims. In the introduction to her "A Study in Susceptibility" she wrote: "By looking into my family history I have discovered that five of my relatives began having arthritis in childhood or adolescence, leading in every case to severe crippling or early death. In the future it is anticipated that other children will be susceptible and will develop the disease at an early age. This study was made in the interest of these children, as well as children in other families having a high incidence, in the hopes that it will be a contribution toward the eventual cure and prevention of arthritis."

One thing in particular Evelyn wished to investigate. All her life she had heard it said that "rheumatism runs in the family." Her grandmother, a great-aunt, many members of the older generation believed it. Was it just an "old saying," a part of the folk-lore of Nash County? Or was it a scientific fact? She was determined to find out if the modern science of genetics could throw any light on the question.

She began going to libraries, reading scientific papers and reports, consulting medical journals, borrowing text-books on heredity and medical genetics, technical works that would be beyond the comprehension of most readers. Dr. R. Ruggles Gates, author of *Human Genetics*, took an immediate interest in her studies. Writing from Harvard University, he gave her pro-

Evelyn has a nurse-chauffeur to make possible her tours in the interest of research. Here she is with Catherine Gantt.

fessional advice on problems of genetics, suggesting that her papers might be published in journals here or in England. Dr. Gates continued helping her until she got in touch with a geneticist in her home State, but she still keeps him informed of progress. And in April, 1952, he accompanied Evelyn and Drs. Whittinghill and Taylor on another research tour.

Her native Nash County is the main field of her activities. Hers is a widely connected family of good, plain, middle-class people—the salt of the earth of any country—who have had their roots deep in the soil of Nash County for seven or more generations. Among these relatives she has discovered more than twenty crippling cases of arthritis. One of her brothers has spondylitis (arthritis of the spine) and other members of her family have rheumatic diseases. A genealogy of 2000 names of these inter-related families—the Hendricks, Deans, Joyners, Rackleys, Wards, and Batchelors—has been compiled by looking up old records, family Bibles, legal documents, as well as from living relatives.

By the end of 1949, deeply involved in the work, she wrote Dr. Robert M. Stecher, former president of the American Rheumatism Association, to whom Dr. Gates had sent some of her pedigrees, and he, too, became interested. Later while in North Carolina to give a lecture on "Heredity in the Rheumatic Diseases" at Duke Hospital, Dr. Stecher took time out to go to Nash County to meet Evelyn and inspect her research project. He was so impressed with her pedigrees and medical reports that his comment was: "This is a gold mine." Having already made studies revealing that certain types of arthritis, Heberden's nodes and spondylitis, are hereditary, he was impressed to find here much evidence that rheumatoid, "the great crippler," is also hereditary.

Later Dr. Stecher wrote her: "Your work in gathering data is absolutely invaluable. I am very happy to collaborate with you and Dr. Whittinghill in any way; I shall be glad to help with the writing of the actual article, if you wish me to, whether I am co-author or not. You are welcome to all my clinical skill and arthritic reputation."

From the beginning Evelyn had developed the project as she went along. It was an entirely different method of procedure from writing about birds, flowers, and the outdoors. She had to learn to make pedigrees, then medical pedigrees; charts using various symbols to show the incidence of an inherited trait, still the most important feature of her work; how to use medical data obtained from hospital records, and information obtained during her interviews with patients.

In the summer of 1950 came one of the most momentous events in her career. Dr. Maurice Whittinghill came into the picture. Dr. Whittinghill, a young geneticist at the University of North Carolina, was doing research on the fruit fly, *Drosophila*, and he took an immediate interest in Evelyn's studies of human heredity. It was he who had accompanied Dr. Stecher to Evelyn's home and county. Analyzing the material she had, he offered to collaborate with her in the publication of a scientific paper, and urged her to come for conferences as often as she could.

The following spring a paper under their joint authorship, "Studies on the Inheritance of Rheumatoid Arthritis in a Nash County Pedigree," was presented at a meeting of the North Carolina Academy of Science at Duke University.

What a milestone! In her wheel chair, tiny, elf-like Evelyn Hendricks, who had had to drop out of high school at the end of her sophomore year, attended the meeting of the learned scientists of this and other States, while Dr. Whittinghill gave an illustrated lecture on pedigrees of 110 persons on which she had so painstakingly worked for so many months.

Widening her activities, she made pedigrees of other inherited conditions, such as muscular dystrophy, which had crippled several teen-age boys in a distant

branch of the family. Again Dr. Whittinghill analyzed this pedigree, determining the mode of inheritance and again, under joint authorship, a paper entitled "Muscular Dystrophy in a Nash County Family" was presented before a group of scientists, this time the Association of Southeastern Biologists, at Tuscaloosa. Analysis has also been made of a pedigree of the Laurence-Moon-Biedl syndrome, a type of hereditary blindness affecting children.

Have you been asking: "*How* did this indefatigable wheel chair naturalist and research worker get about to make these county-wide studies, with trips also to Raleigh, to the State University at Chapel Hill, to Duke Hospital at Durham, to libraries, historical commissions and art galleries?" A colored maid-chauffeur who drives the car can easily pick up tiny Evelyn to carry her in and out of homes, libraries, conference rooms. Such an attendant was with her the summer she spent at Duke University Summer School. Sometimes, the ever necessary wheel chair folded up and put in the trunk of the car, they go on two-or-three-day trips.

Of course, finances were bound to become a problem. In the beginning Evelyn's parents had financed the research, but after more than $400 had been spent, it was realized that this was entailing too much of a sacrifice on the part of a semi-invalid father and mother, and a family that had had unusually high medical and hospital care for many years. So Evelyn began looking for outside funds, as she understood that even though her important studies should be published, they would bring no monetary return. No payment is made for articles in those scholarly scientific journals. In September, 1949, the Rotary Club of Rocky Mount, near her home town, gave a grant of $550 to cover expenses for two years, with a member, Dr. Kenneth Weeks, acting as chairman of the sponsoring committee.

In search for further funds to broaden the research, for by now authorities in the field were greatly interested and wanted the study to be extended to cover a larger group of people, Dr. Whittinghill had applied to the U.S. Public Health Service for a grant-in-aid, the project to be entitled "A Study of the Mode of Inheritance of Rheumatoid Arthritis." The application was approved, and beginning in September, 1951, a grant of $3963 was awarded for a year's research.

And then came another milestone for Evelyn. Dr. Whittinghill, supervisor of the project, appointed Evelyn as his research assistant. For the first time in her life she was earning a salary! Think what that alone can mean to her! The grant also includes funds for a maid-chauffeur, as well as mileage for the family car when she uses it on the project.

In the fall of 1951 another physician became interested, Dr. Gervas S. Taylor, of the University of North Carolina Infirmary. Offering his assistance, he, too, made several trips to Nash County, accompanying Dr. Whittinghill and a medical secretary, Miss Doris Lindsay. With Evelyn, the research group traveled about the county, visiting shut-in arthritics, the doctor giving examinations to determine the type of rheumatic disease and dictating medical notes to be written up.

Throughout last fall Dr. Stecher was in Europe, speaking before scientific societies on his subject of heredity and rheumatic diseases. Upon his return he planned to visit Nash County again, and both Dr. Whittinghill and Evelyn are looking forward to his collaborating with them. Present plans are that Evelyn will continue her research, Dr. Whittinghill will analyze the pedigrees and handle problems in genetics, and Dr. Stecher will be medical adviser and write the final publication, under the names of Stecher, Whittinghill and Hendricks.

What are the practical possibilities of this type of basic research? It may help to determine the underlying causes of rheumatoid arthritis, which does, indeed, seem to "run in the family." If so, it will be possible to make predictions on the grounds of Mendelian laws of heredity. "It may be possible," says Dr. Whittingnill, "to assure some persons that they are free of the genetic determiners for rheumatoid arthritis. Others may be warned as to how high the chances are that they, or their children, will develop arthritis, and the use of ACTH or other treatment at an early age be indicated. And with a knowledge of where to locate persons who may be in preclinical stages of rheumatism, or of rheumatoid arthritis, members of the medical profession may be able to initiate studies of systemic conditions which may ultimately make possible earlier diagnosis, and probably earlier cure. The saving of human resources could be very great."

As for Evelyn, she is happy and grateful for all the interest and cooperation she has received. Recently she wrote me: "Sometimes I wonder how I am going to be worth all the things that are being done for me. I suppose that I shall have to work harder than ever in the future."

And what of that future? The research grant lasts a year. And after that? I spent a day with Evelyn and her family recently. Part of the time she and I were alone and we had a (Continued on page 386

Contrast In September

By GILEAN DOUGLAS

Now we go softly where the old years went;
Slowly and gently through the autumn days,
With time a drifting of September haze
Across blue hills and fields of calm content
Where wind walks seaward, warmly redolent
Of tansy, cartridge, forest fire and maize,
While in the quiet ebb of sheltered bays
Scoter and guillemot are alert, intent.
Not any more for them the careless flight,
The lazy feeding and the restful sleep;
They are the driven, fleeing down the gale,
Whose only refuge is the wing of night,
Whose only hope is instinct watch to keep
Upon September's masquerading veil.

A young garter-snake, about as thick as a lead pencil and not much longer.

Garter-Snakes in Saskatchewan

By H. H. PITTMAN

Photographs © by the Author

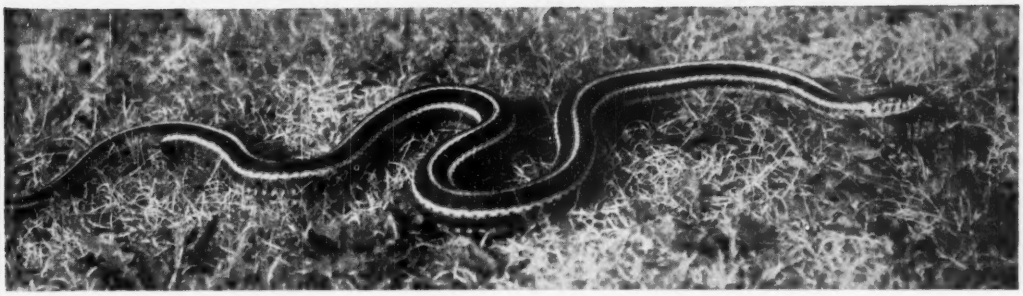
COUNTRY people have always believed that the wild creatures of the fields and forests are weather-wise, and that we can foretell meteorological changes or disturbances by observing their actions and behavior. I have heard this all my life, but always found the evidence contradictory and unsatisfactory. Looking back now over the years, I am beginning to wonder if my casual and careless observations were not at fault, and, by considering the matter from the human point of view alone, whether I failed to understand what I saw. An interesting experience with the common garter-snakes of the Saskatchewan prairie has made me review the matter again more thoughtfully.

As I recall it now, 1949 was a perfectly normal year in southeastern Saskatchewan, with the customary variations of temperature and the usual amount of rain and wind. There was nothing at all to record about the weather or the movements of animal life, and my note-books, for one reason or another, had more blank pages than usual. It was, for me, a rather dull season until September 24. On that afternoon my youngest daughter opened the front door and said there was a snake beside the step. Shortly afterwards she bounced in again to tell me there was one on each side of the step. On going out of another door I found two more at the side of the house. From September 24 until October 7 we were visited by twenty-five or thirty snakes daily. Then their numbers declined and the last ones were seen on October 14.

A tiny hole left by striped ground-squirrels in the grass beside the house seemed to be the attraction, and we watched several snakes gliding down. This was most interesting until it was suddenly remembered that the lower end of the tunnel was in our cellar! We found snakes on the doorsteps, on the garden paths, on the lawns and under the hedges. Garter-snakes like to congregate in the autumn to hibernate and apparently the knoll on which my house stands is an ancient gathering place.

Although garter-snakes sometimes assemble in large numbers to hibernate, literally in masses, I have more frequently found them in small parties in the deserted dens of small rodents. My lawns and flower-beds are criss-crossed by scores of tunnels excavated by ground-squirrels and pocket-gophers, some of which lead down to chambers six or seven feet beneath the surface, well below the level to which frost is likely to penetrate. These deep dens have the even temperature necessary for hibernation and are popular with snakes.

The year 1950 was unusually wet, and a great deal of low-lying prairie was flooded in both Saskatchewan



A handsome specimen of garter-snake, this one thirty-eight and one-half inches long. It was photographed in Saskatchewan, Canada.

and Manitoba. My basement, although unfinished, was the only dry one in the district. Naturally, this knoll would not only be suitable but attractive to reptiles seeking dry winter quarters, and their unusual abundance in 1949 suggests they knew floods were coming and that dens in low-lying land would be unusable. They were determined to get to this place and absolutely refused to be driven away. An interesting and perhaps important fact is that our visitors varied so much in age, for, in addition to veterans more than three feet long, we had many little ones that were obviously only about a month old. The knoll referred to is not the highest spot in the vicinity but is particularly well drained by a sharp slope on the north side of the house. We always find a few snakes here, but have never had so many as in the late autumn of 1949, just before the year of the widespread flooding.

Garter-snakes are found in all the prairie provinces, and although they show some variation in color, when specimens from widely separated points are compared, all are easily recognized by the longitudinal stripes of black, orange and yellow. They lack the poison fangs of venomous species and are quite harmless, although, if sufficiently provoked, they can and sometimes do emit a most sickening odor. However, this seems to be rarely done and most of the specimens found can be picked up and handled without any unpleasant effects.

Although many kinds of snakes lay eggs, young garter-snakes are born like mammals, enclosed in membranous sacs, which rupture at birth. Those young ones I have examined, some just before birth and others immediately after, were all about six and three-quarter inches long. I have never known a garter-snake to produce more than twelve young ones, but other observers record births of twenty or thirty, and even more. I once found a large snake that would have had seven. Surprisingly, young garter-snakes are born quite late in the summer and sometimes hibernate before they are much longer than an ordinary lead pencil. How they find the ancestral meeting-places is uncertain. It may be by scent, although it is hard to imagine a perceptible scent-trail persisting across a closely mowed lawn or dusty highway long enough to be of much use. All the young ones I have seen were much darker than adults, the orange and yellow stripes being narrow and dull.

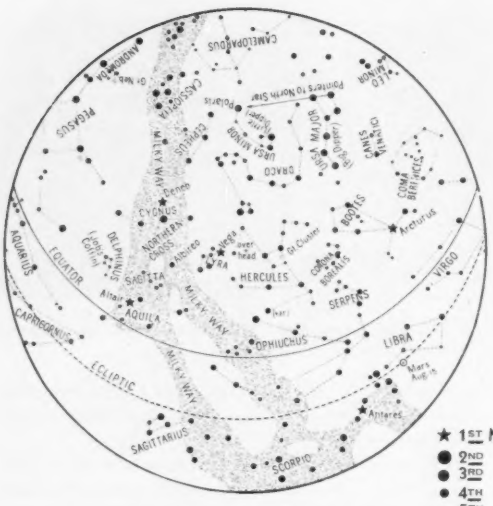
It is probable that garter-snakes have a keen sense of smell and can gather useful information with their nostrils. When I have been gently driving them in a direction in which they did not want to go I have often seen them pause at a hole in the ground and put their heads down a few inches, apparently to find if the owner was there, or, perhaps, if other snakes were present. I once watched a couple of large snakes reject two holes and then slip down a third one until I had passed. It is probable that a garter-snake would try to avoid meeting an adult pocket-gopher in a narrow tunnel.

Garter-snakes shed their skins several times during the summer to allow for growth. The cast-off skins are complete, even to the eye scales, but are almost colorless and, of course, inside out. Secluded spots are generally chosen at such times, and low-lying branches or stiff weed stems are frequently used to help pull the old skin off.

A favorite place here for the troublesome operation is at the base of a bush or hedge. Immediately before "sloughing" the snakes are inclined to be somewhat sluggish, which is understandable, and they are also temporarily blind until the loosened eye-scales can be scraped clear from the head. The length of time taken seems to depend upon the health and vitality of the reptiles, but I have known one nearly two feet long to shed in about twenty minutes.

The largest garter-snakes are usually females, and the longest I have handled measured exactly 38½ inches. I have always considered a snake three feet in length to be a fine specimen, and anything over that exceptional on the prairie, but it is quite possible larger ones can be found where the climate is less severe. While size is frequently a guide in determining sex a practised eye can usually detect a slight difference in shape, even at some distance.

It is often asked if a snake will swallow her young ones when danger threatens, and a great deal has been written about this matter without satisfactorily proving or disproving it. Even on (Continued on page 386)



9 P.M., Aug. 1; 8 P.M., Aug. 15.

★ 1ST MAGNITUDE
● 2ND "
● 3RD "
● 4TH "
• 5TH "

9 P.M., Sept. 1; 8 P.M., Sept. 15; 7 P.M.; Sept. 30.

To use these maps hold them before you in a vertical position and turn until the direction of the compass that you wish to face is at the bottom. Then, below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south. Times given are Eastern Standard.

August-September Heavens

By ISABEL M. LEWIS

IT WILL be of special interest during these two months to compare, in the southwestern evening skies, the still brilliant planet Mars with the first magnitude star Antares in the constellation of Scorpio. One should observe these two particularly about September 10, when Mars passes Antares from west to east and at a distance to the north of it of less than three degrees. Antares, the name of this brilliant red star, is a Greek word meaning "Rival of Mars," and there are times, when Mars is at certain distances from the earth, that it is equal to Antares in apparent brightness as well as similar to it in color. Yet one of these two bodies is a planet with a diameter a little more than half that of the earth, and the other a giant red star, so huge that if it were in the position of our own sun its surface would lie far beyond the *orbit* of Mars, and our own planet would be buried far in its interior!

Mars will move very rapidly against the background of the constellations from August 1 to October 1. At the beginning of August it will be in the constellation of Libra, very close to Alpha Librae, which is the southernmost of the two third magnitude stars that form a pair about six degrees apart indicating the position of The Scales in Libra. Mars is then exactly of zero magnitude, or slightly more brilliant than Vega or Arcturus. During August it will move gradually in a southeastward direction through Libra to the boundary between this constellation and Scorpio. It will pass into the constellation of Scorpio about August 25, but will take only about ten days to cross the northern part of this brilliant group of stars into the extreme southern part of the constellation of Ophiuchus. It is in this constellation when, about September 10, it passes Antares on the north, and comes nearest to it in angular distance. By that time Mars has decreased noticeably in brightness. By the middle of August it is about equal in brightness to Vega and Arcturus, two stars that differ only slightly in brightness. When nearest Antares, for all of its loss in apparent brightness, Mars far outshines this "Rival of Mars." One will have no difficulty deciding which is the nearby planet and which is the far distant giant star. During September, Mars continues its west to east motion through the heavens, and decreases slowly in brightness as its distance from the earth increases. It will not pass from Ophiuchus into Sagittarius until early in October, and will be found throughout August and September low in the southwestern sky after sunset. The distance of Mars from the earth will increase from about 86,000,000 miles on August 1 to about 118,000,000 miles on September 30.

Both Mercury and Venus will be poorly placed for

observation in the evening sky in August and September. On August 12 Mercury will be in inferior conjunction with the sun. It will then pass from the evening to the morning sky. On August 29 it will be at greatest western elongation, and will be in fine position for observation in the morning twilight for some days around that time. When visible near the time of its more favorable elongations Mercury is a very beautiful object in the twilight. It may then be, and often is, more brilliant than Vega, which it resembles also in color at such times. At the August elongation in the morning sky this year it will be very favorably placed for observation, reaching an elevation above the eastern horizon of as much as 15 degrees at sunrise on August 29. Except for a week or so early in September it will be too near the eastern horizon in the morning sky to be seen to advantage, and on September 24 it will be at superior conjunction with the sun and will pass to the evening sky, lost to view in the rays of the setting sun for the remainder of the month. Venus is now in the evening sky but so near the western horizon at sunset during these two months that it is difficult to observe it. Mercury and Venus will be in conjunction, very low in the western sky at sunset on August 4 and possibly might be seen at that time, more than six degrees apart, with the aid of binoculars. Mercury will then be south of Venus, although at that time no brighter than a star of the second magnitude. The best time to observe these planets telescopically is in the daytime when at a high elevation above the horizon, screening off the rays of the sun.

During these two months, Jupiter will not be seen rising in the east until several hours after sunset. Early in August it will rise near midnight. It will remain in the western part of the constellation of Aries not far from the boundary between this constellation and Taurus throughout this period. On September 9 Jupiter becomes stationary in west to east motion and after that reverses its direction of apparent motion among the stars and moves in the east to west direction, or retrogrades. After it appears in the east late in the evening Jupiter will be the most brilliant object in view for the remainder of the night. It is surpassed in brightness by none of the stars and only the planet Venus, except on the very rare occasions when Mars is exceptionally close to the earth. Then, for a short period, it is brighter than Jupiter.

Saturn is not at all well placed for observation in August or September. It is low in the southwest at sunset, remaining in Virgo during these two months a few degrees northwest of Spica. It resembles a pale yellowish star of the first magnitude in brightness, and at this time is almost exactly equal to Spica in brilliancy. On September 15 Venus and Saturn will be in conjunction, with Venus less than two degrees to the south of Saturn. Although both planets are then very low in the west at sunset it might be possible to observe with binoculars the two close together in angular position at that time.

Those observing the evening skies up to midnight, or better in the early hours after midnight, should see many members of the Perseid swarm of meteors whose orbit crosses that of the earth in August. This swarm of meteors is so widely scattered along its orbit, which is the same as that of the bright comet of 1862, which is known as Tuttle's comet, that the earth encounters and sweeps up in its atmosphere various members of the swarm for a period of several weeks, although they are met in greatest numbers on August 11-12. Some swarms of meteors are so closely packed together that the earth passes through them, where the two orbits meet, in a few hours. Some swarms are met by the earth "head on" on the advancing or morning side of the earth. Such meteors enter the earth's atmosphere at great relative velocities of 40 miles or more per second and have short, swift, brilliant, bluish streaks or trails. They appear in greatest numbers before sunrise. Such are the Leonids which appear to come from the direction of The Sickle in Leo. The slow-moving, reddish Andromedes overtake the earth and so appear in the evening hours. The Perseids move with moderate velocity and are rather yellowish in color. All periodic swarms of meteors are named for the constellation in which the radiant, or direction from which the swarm appears to come, is located.

The average meteor, or shooting star, as it is sometimes called, weighs about a grain, enters the earth's atmosphere at a height of 50 or 60 miles above the earth's surface, and flashes up to incandescence for a second or so as it is consumed by the friction produced by its encounter with the atmosphere. These tiny particles are in quite a different class from the fire-balls or meteorites that may weigh many ounces or pounds and may strike the earth's surface and break into fragments after a long brilliant and noisy passage through the atmosphere. Such meteorites have never been known to appear during a periodic appearance of any of the well-known swarms, and have, probably, quite a different origin.

In August this year there will also be two eclipses, a partial eclipse of the moon on August 5, and an annular eclipse of the sun on August 20. The lunar eclipse will not be visible in North America. It will be seen, in general, in the western (Continued on page 386)

Soliloquy

By FELICE DE HORVATH

Star-light, star-bright
Is it you I see to-night?
Or just the impulse you once sent
Across the mighty firmament.

How I wonder where you are,
Diamond jewelled little star;
Do you show your lovely face
From quite another point in space,
Or have you, long since, quietly,
Slipped into the dreamless sea?

Star-light, star-bright,
Is it you I see to-night?

The School Page

By E. LAURENCE PALMER

Professor of Nature and Science Education, Cornell University, and Director of Nature Education, The American Nature Association

BEES, WASPS AND ANTS IN SCHOOL

THERE is probably not a school room in the country that is not visited rather regularly in season by some bee, wasp, ant or relative of these insects. In all probability a majority of these insects are killed by the teacher, or by the students. This is true regardless of whether the insects are useful or injurious, and yet one function of the school is to develop intelligent behavior on the part of the students. Why talk about these high sounding objectives of education if we do not put them into practice when opportunity offers?

Most of us know honeybees. We may know from experience that they sting and we leave them alone. In some schools we have observation hives where children may observe what goes on in the hive. Such a feature is worthy of encouragement.

If the children have their lunches in or near the school room there is every probability that they may be visited by some of the yellow-jackets, which seem unable to resist the fragrance of jam or ripe fruits in the early fall months. If you wish to observe a few of these insects leave some ripe fruit outside on the windowsill in September, or dab a bit of jam where it may be found by the insects.

Children frequently bring in various galls found on plants. A surprising number of these are formed by gall wasps. In this educational insert we mention the mossy rose gall that is made by a gall wasp. In the 45th insert we showed you pictures of a number of others caused by wasps.

In the spring, when queen bumblebees may be found bumbling around a school in search of a hole in which they may establish a nest, you might take a chalk box and paint the inside black. Put a plate of glass where the cover would be and cover this with something dark. Run a piece of garden hose from a hole in the box on the windowsill outside so that the free end of the hose may be found by a searching bumblebee. We have had reports of bumblebees establishing a nest inside school rooms in boxes of this sort.

In many schools, in fall and spring, we find the larger mud dauber wasps on the windows. Normally they will not sting unless they are confined in the hand. Put one of these insects in a quart fruit jar in which is a small thermometer. With ice packs and hot water bottles, raise and lower the temperature in the bottle and notice the behavior of the wasp. What you see in the bottle may help you understand how temperature affects the behavior of these wasps and why they are so seasonal as they seem to be. Wrap the bottles in different colored cellophane to learn if they are affected in any way by different colors of light. You may be surprised at what you find.

If you have an aquarium in your school room, it may be visited in warm, dry weather by ants. I well remember one such aquarium in a California school. The ants that came to the aquarium looked normal, but those that went away looked as though they had faint rings around their abdomens. The reason was that the ants filled themselves so full of water that they stretched their abdominal segments to the limit.

Children usually love to bring things into the school to examine them and to ask questions about them. They may be interested in bringing in a few mud dauber nests to see the paralyzed creatures to be found in them. Most of these will be spiders, but not all wasps use spiders. Knowledge of what goes on in a mud dauber's nest may arouse interest in finding other wasp nests. Some of these, like the nests of yellow jackets and hornets, should probably be left strictly alone, but the digger wasps generally mind their own business, and what they do with their captive is too interesting to be ignored by any alert teacher. It is not likely that this can be observed in most schools after the first few weeks of the fall term.

It may be fun to have a winter field trip to study insects of this group. Some of them may be found hibernating under shingles, under stones, in holes in boards, in attics and cellars. Many of them leave their nests suspended in conspicuous places. In winter most of the surviving animals are queens, but this is not a safe generalization to be applied too widely. Some will winter as larvae, some as eggs, some as pupae and some as adults. The insert in this magazine will enrich this statement.

In winter it is generally safe to open and examine some of the huge paper nests of hornets, which could not be approached with any safety in summer. The story of how these houses grow, are torn down and rebuilt, and how the paper is made from wood is well worth study. It will probably be found, in most parts of the United States, that there is no month in the year when free, live adult bees or wasps may not be found outdoors. In the dead of winter a slight thaw may start the sap flowing in a broken twig. To it come the season's first honeybees. From then on through the year one or another of our hymenopterous friends may be available for experimentation or observation.

All sorts of studies will suggest themselves if you observe the different parts of the room in which wasps, bees and ants may be found. If there are windows on more than one side of the room to which of them do they go and why? Do they favor the lower or upper parts of the windows, and how does the temperature and light vary in the places where they are or are not to be found? If any of them can be attracted to food, what preferences do they show for different kinds of food? Will some eat sour things while others eat only sweet things? Which, if any, of them consume the food they get on the spot, and which, if any, show a desire to transport food to some other place for some reason or other? When the storers take their supply away do they always leave the supply by the same route, or do they go in any direction? Do they return to the supply by a direct route, indicating that they seem to know what they are doing? If you are working with ants, how do they behave if other insects, or even other ants, are placed in the vicinity of their nests?

Get some green glass trays and some of blue glass and clear glass. Confine a few ants in these trays and observe if they behave differently in the different colored light. These trays may provide interesting arenas in which may be observed the relationships between a blue mud dauber and a spider that you may put in with it. Some teachers may object to staging this sort of thing, but others may recognize in it the educational value that is there. Of course a mud dauber that is not at the time engaged in getting spiders for its nest may well ignore the opportunity you attempt to present to it. Certainly many children in season will be able to find in a mud dauber's nest either the egg or grub of the wasp with the fresh food supply of spiders.

In winter, or at any time of the year, children may enjoy trying to find the burrows of some of the carpenter bees. Dead stems of lilac, sumac and elderberry may be worth investigating. Split the stems lengthwise and eventually you will find either a carpenter bee's work, or even the work of a leaf-cutter bee. In either case you will have material that will interest children immediately. You can then give them an experience that they will probably never forget by just giving them the story to be found about these insects in the chart section of the insert in this issue.

The week before I wrote this I drove 600 miles to conduct a teachers' workshop in Connecticut. I took the teachers down to see a pit the athletic teams were using for their jumps. We found in the pit a beautiful soil profile. Better than that, on the side exposed to the sun were the burrows of a great number of little digger wasps. You never know what you are going to find when you start exploring a schoolroom or, better yet, a school yard. Another school I visited last fall had a crevice in a wall just outside one room in which bumblebees had crawled for their winter hibernation. So the story goes. Forget what I have written in this magazine and go out and find things for yourself. I am sure there are plenty of good lessons right at hand waiting for you.

CAPE MAY'S FIRING LINE

(Continued from page 373)

could arm themselves with vermin permits and enjoy complete immunity all the year round, while under the present law a vermin licensee can shoot only the three unprotected hawks. In 1950, 2626 vermin permits were issued, and the *reported* kill included 42,700 crows, 1962 unprotected hawks and other wildlife, including "wild dogs," cats and turtles!

What, then, is the solution of Cape May's long standing scandal of hawk shooting? Here is a great unprotected flight line. With the first northwest winds of September it will again resound with gunfire. There is growing sentiment among conservationists that migration flight lines should not be used as a hunting ground if we are to preserve any considerable populations of wild birds.

The surest protection of Cape May's flight lines should come from Cape May itself, from a local sanctuary with a broad base of public support. To this end a no-shooting zone, established by township ordinances, would appear the best answer. Let us, by all means, have a hawk law, too, provided it has no insidious exceptions. But let us remember that a hawk law, even a perfect hawk law, depends for its enforcement on a sympathetic department of Fish and Game, while a local sanctuary, locally promoted, commands its own support.

How can any of us lend support to the establishment of a Cape May sanctuary? Fortunately, we have an immediate opportunity. The Chamber of Commerce last year issued invitations to 350 bird clubs for its conference of bird watchers in late September. This year it plans an even larger gathering. In their reply to this invitation it is suggested that all bird clubs impress on the Chamber of Commerce their shocked concern at wanton hawk shooting, and their desire to see Cape May's great flight lines protected by a sanctuary south of the canal, leaving it to the Chamber of Commerce itself to find the means.

Quoting Nature

Nature Interlude. Compiled by E.F. Linssen. London. 1952. Williams and Norgate, Ltd. 256 pages. 12s./6d.

This is a book of natural history quotations, compiled and selected after years of reading of Nature literature, in prose and poetry, by the author. The quotations are grouped by subject matter and there is an index to the authors quoted.

Pennsylvania Trees

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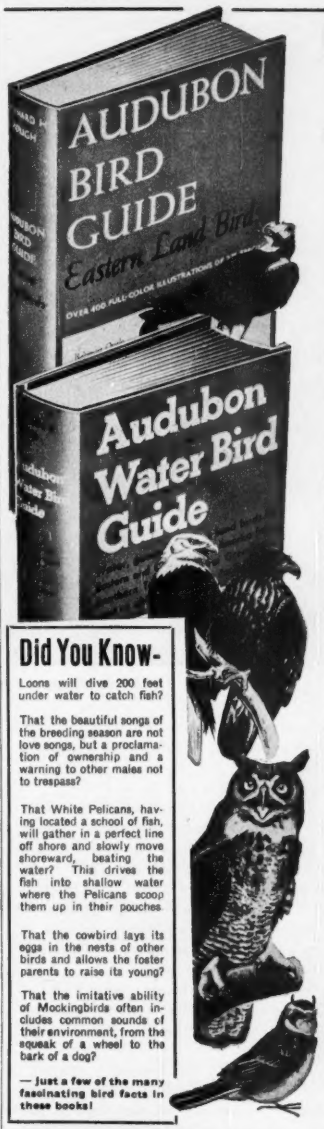

Did You Know-

Loons will dive 200 feet under water to catch fish?

That the beautiful songs of the breeding season are not love songs, but a proclamation of ownership and a warning to other males not to trespass?

That White Pelicans, having located a school of fish, will gather in a perfect line off shore and slowly move shoreward, beating the water? This drives the fish into shallow water where the Pelicans scoop them up in their pouches.

That the cowbird lays its eggs in the nests of other birds and allows the foster parents to raise its young?

That the imitative ability of Mockingbirds often includes common sounds of their environment, from the squeak of a wheel to the bark of a dog?

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Camera Trails

By
EDNA HOFFMAN EVANS

Are you a bug-ologist?

Yes, I said a bug-ologist, not an entomologist. By a bug-ologist I mean a person who is mildly interested in bugs—more specifically, a camera fan who takes a bug picture now and then without specializing exclusively in insects or their close relatives. An entomologist, on the other hand, is one who is concerned almost exclusively with the study of insects and their habits. Such a person would be an entomologist first and a camera fan second. To him, photographs would be merely an offshoot from or an aid to his studies.

Personally, I am a bug-ologist. I can take bugs or I can let them alone. They do not bother me particularly. I do not kill spiders (I know they are not insects) nor do I swat at wasps, or shriek with terror when some six-legged critter scampers over my shoulder or even tumbles down my neck. Only one breed—scorpions—(and I know they are not insects, either) really gives me the shudders. The gooseflesh I raise at the sight of a scorpion feels like sandpaper for hours after one of the curly-tailed arachnids crosses my path. So, if you do not mind, even though they do make interesting camera subjects, let us leave scorpions out of this discussion of "bug" photography.

While I may use the terms "insect" and "bug" as synonyms, I realize that the words mean specific things so far as taxonomy is concerned. But I am writing this for cameramen and not for scientists. Thus, I hope the next mail will not bring me a batch of letters from outraged entomologists. If it does, I will just unlimber my flit gun and fire back.

Seriously, though, insects do make good photographic subjects. They are, however, more difficult to photograph than some other natural history models. For one thing, they are usually rather small. For another, they often move so rapidly and cover so much territory that their antics are difficult to capture on film.

Many striking insect pictures have been taken in the years since cameras were perfected. There have been black-and-white shots and color shots, motion pictures and stills. With the aid of magnifying devices and enlarging procedures, very small insects have been photographed and "blown up" until they look like monsters out of the worst of all nightmares.

The best insect pictures, from the standpoint of science, are those taken in series, showing all the phases of development in the life cycle of a single species. This is a sort of "cradle to the grave"

A grasshopper "habitat" group.

proposition, or, more accurately, an egg-larva-pupa-adult series, with variations depending on the life phases of the particular kind being studied.

Taking pictures of this sort is not done at a moment's whim. A life history series is plotted and planned for, observed and guarded with painstaking care. Of necessity, it covers a considerable lapse of time. Often it does not mark the span of a single individual's lifetime. Indeed, it may take years—generations, actually—before the series is complete.

Suppose, for example, you wish to photograph the life history of some special insect—say, a butterfly or a moth. What would you do first?

The answer is, you become a collector. First of all, you find examples of your subject. Depending on the time of the year, you may find eggs deposited somewhere. Or you may find cocoons or pupa cases. Then again, you may find the adults; perhaps they will lay eggs for you. At any rate, you begin somewhere along the cycle. Collect not one, but a goodly number of specimens. Accidents can happen and you want enough samples so that at least some have a fair chance of survival.

Now you need some place where you can keep your specimens, a place where you can control conditions so that they will be as natural and favorable as possible. Your specimens may need to be kept moist or dry, warm or cool, and they may need to be kept for several weeks, or even months.

During that time you cannot forget them. You must watch them carefully, checking each day or several times a day, for signs of change. You want to be ready with your camera to catch the steps of metamorphosis as well as the periods between changes.

With butterflies and moths, of course, the most spectacular change occurs when the beautiful winged adult emerges from the cocoon or pupa case. This transformation often is preceded by a lengthy period of inactivity. Then, when the right time arrives, out comes the adult. In a short time it has left the covering in which it made the change from wingless larva to winged adult. Its damp wings dry and set, and away it flies.

Even though you have the specimens confined in a room, so that they cannot fly completely away, they are now less photographable than they were at any other time in their lives. Besides, it is that brief period of transformation that

The big brown-striped walkingstick is an easy model, if you can find one to photograph.

provides the most spectacular pictures.

As I said before, the more specimens you have, the greater chance you have to make a complete series. If you miss one individual's metamorphosis, you may be on hand for another. Or, if for some reason one of the specimens is damaged, others may emerge intact.

There are times, alas, when you may miss one stage in the life cycle. In a case like that, you must wait until the proper time next year and try again. Some insect photographers have spent years—two, three, five, ten, or more—getting a complete photographic record of a life cycle.

Such techniques are definitely scientific, and photographers who follow them are more apt to be entomologists than bug-ologists.

On the other hand, there are interesting and spectacular pictures available to the lens-happy bug-ologist, too. There are also definite limitations to what the free lance bug-photographer can do.

It is a hard job, in fact I will say that it is well nigh impossible, to photograph a free butterfly, on the wing, outdoors. Watch how the bright-winged things flit here and there, now hovering at ground level and the next instant soaring over the tree tops fifty yards away.

I have tried to stalk them and I have tried aiming the camera at a likely looking blossom and waiting. No luck. They either whisk themselves away before I am ready to shoot, or they carefully investigate every flower except the one on which my lens is focused. Butterfly shots are taken under controlled conditions with the subject confined; they are not taken in the "wild."

Dragon flies make more obliging models. In fact, owing to their fondness for perching on likely twigs and leaf ends, they can occasionally be stalked successfully. With them, backgrounds are important. Somehow, the photographer must maneuver so that their lacy wings show up to the best advantage. They, too, can be photographed best in captivity.

Probably one of the most spectacular subjects a photographer can find is a preying mantis. These piously grotesque creatures are "natural" models and they pose obligingly. The chief difficulty with them is the length of the body and the spread of the legs. Without proper lighting, it is difficult to obtain enough depth of field to bring the entire body into focus. So even here indoor controlled lighting is better than that available outdoors.

All the specimens I have mentioned thus far present rather advanced, complicated problems. I do not recommend any of them as subjects for the beginning bug-ologist.

I think the easiest insect subjects are spiders (not insects), grasshoppers, and those big brown walkingsticks that are fairly common at this season of the year. The bumbling big "june bugs" or rhinoceros beetles, common in some places, look like wonderful possibilities but, so far as I am concerned, photographic results with them are disappointing. They are all one color, a solid, shiny brown. Highlights or no highlights, their pictures are usually lacking in both detail and interest.

Spider and spiderweb pictures are always interesting—the bigger the spider and the more showy the web, the better. If possible, find a web that hangs clear (free of obstructions) and is arranged so that you can photograph it against a dark background. If necessary, set up a dark cloth back of it so that there can be nothing in the background to detract from the spider and web in the foreground.

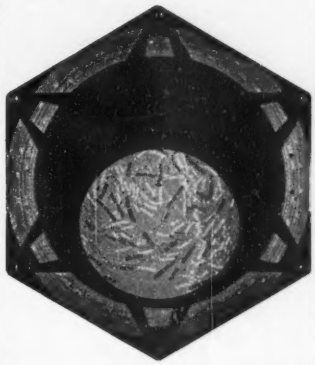
Ideally, a dew-spangled web is the most beautiful. But that usually means early morning or a time when light is not too good. A similar effect can be obtained by sprinkling the web lightly; the fine spray from a hose nozzle will deliver about the right amount of moisture. The trouble there is that the spray usually chases the spider away and, when the web's owner does return to her chosen place, her motions usually shake most of the droplets from the slender fibers. Exasperating, is it not?

Grasshoppers, particularly the big, non-flying kind, make good models, too, either taken as individuals or in what might be called habitat groups. The same can be said of the walkingsticks, although they usually are found singly or in pairs, the male much smaller than his formidable looking mate.

As for equipment, the scientific insect photographer uses elaborate equipment designed especially for his particular needs. The bug-ologist can get good pictures with less elaborate material.

Because of the size—lack of size, really—of the insect subject, it is desirable to get as close as possible to it. This necessitates some auxiliary focusing device—portrait lens, extension tube, or extra

Know Your Stars



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extension bellows. Speed is of no great importance. We are trying to capture details rather than to stop motion in insect photography.

The subject should be placed so that as much of its body as possible lies in the same plane. The closer we get to it, the more we tend to sacrifice in depth of focus. Head-on pictures are spectacular, but usually they are pictures of nothing but the head.

Insect pictures are better, as a rule, from insect level. Taken from above, they tend to flatten out and appear foreshortened. Try to picture them in a natural setting, against a background that does not encroach upon them. Then, bug-ologist or entomologist, you will have pictures that are interesting and accurate.

RANDOM JOTTINGS

The May section on cat photography brought a pleasant letter from Miss Zelma Beeve in Santa Rosa, California, together with two pictures of the family cat, "Zero." The cat, so named because his markings form perfect zeros on both sides, likes to perch on the cross arms of the clothes line supports and from that vantage point "helps" to hang out the washing.

On my desk for some time has been a copy of *The Kentucky Naturalist*, reporting the annual salon of Nature photography sponsored by the Kentucky Society of Natural History, and containing reproductions of some of the winning prints. Both color and black-and-white entries were also reproduced in the Louisville *Courier-Journal*. The annual salon is usually held in November and December. Information about the next salon can be obtained from the editor, William F. Furnish, Box 81, University of Louisville, Louisville 8, Ky.

So far as publications are concerned, Eastman has two new ones—"Let's Take Kodacolor Pictures" for 35c, and "Picture Taking in Camp" for 25c. The latter is especially designed to help young camera owners make their summer camping experiences more memorable by recording them on film.

THE DOORYARD

(Continued from page 360)

"Pippin, Pippin, Paradise!
Tell me where my true love lies!"

And then it would be time to bank the house again. And to watch for further developments in the cycle of the years.

Gone now are the roses and lilacs, the old red pump, and the Pippin and Pound Sweet trees. Gone, too, the catnip and tansy beds. In their place extends a broad, smooth tennis court, over which run the feet of scientific, college-bred moderns. I still am glad I knew it as a dooryard.

"WHEEL CHAIR NATURALIST" BECOMES RESEARCH WORKER

(Continued from page 377)

heart-to-heart talk, and knowing her talent for writing, her sensitivity, her philosophy, I asked her to read me some of her sketches. I believe many of them are publishable, and I am hoping that after this year's project is completed she will return to writing, illustrating it with her own drawings, something, perhaps, after the manner of Agnes Newton Keith's *White Man Returns*.

Creative work of this type, I feel, would have a message of hope, of high courage, of perseverance — and of beauty — for a world that is sadly in need of them all.

As for the research, it may be that this little wheel chair naturalist from a remote North Carolina farm home, who had to drop out of high school when but half way through, may have helped find the answer to that scourge of mankind, the "riddle of arthritis."

Stranger things have happened.

GARTER SNAKES IN SASKATCHEWAN

(Continued from page 379)

a closely mowed lawn baby snakes can sink out of sight in a peculiarly uncanny way and I think this ability to disappear would explain most reported occurrences, yet I am unwilling to say it does not happen. If we dissect a snake it will be found that the highly distensible gullet is very long and is separated from the stomach by a strong muscular band. No digestion takes place in the gullet and prey is often disgorged from there, apparently none the worse for temporary incarceration. A snake seems able to hold food in the gullet for long periods and release it to the stomach at will.

The general dislike of snakes is as widely spread on the prairie as anywhere else, and the common practice is to destroy them at every opportunity. Noticing a mass of garter-snakes in an old dry well in southeastern Saskatchewan one autumn day the owner of the land filled it up with earth and stones. Personally, although I find these remarkable and highly specialized creatures extremely interesting, it would be a shock unexpectedly to place my hand upon one in the dark. Almost any person can train or accustom himself to handle snakes, but I have met very few professing really to like them, and their sincerity was open to question. The dislike seems to go back to the remote past and the association of snakes with evil almost as far. Snake-worship—ophiolatry—which still persists, was very probably based upon the fear and abhorrence these creatures aroused in ordinary people.

The food of Saskatchewan garter-snakes consists largely of frogs, toads and insects and probably includes shrews, mice, voles and young birds. My wife once found a large garter-snake holding a young black-billed cuckoo by the foot. However, digestion appears to be a slow (although thorough) process and there are sometimes long periods between meals. After a full meal snakes are often lethargic and inclined to rest, suggesting that swallowing objects of much greater girth than their own is tiring.

Garter-snakes are fond of basking on sunny slopes sheltered from the wind and will return to the same spots day after day, sometimes in small groups. When not in search of food they seem sociable, although it may be that conditions suitable for one attract others. A drop in temperature or sometimes a passing cloud obscuring the sun sends them in search of shelter, and I have noticed that at such times they often enter the shallow runs of voles. These runways, frequently hardly more than little trenches, once they have been warmed by the sun, hold some heat long after the surface of the ground has cooled and I have known a garter-snake to rest in such a place for more than an hour. It must be remembered, however, that snakes cannot stand much heat, for prolonged exposure of captive specimens to strong sunlight is often fatal.

AUGUST-SEPTEMBER HEAVENS

(Continued from page 381)

Pacific, Australia, Asia, Antarctica, Europe, Africa, and the eastern part of South America. At the time of the greatest eclipse about 54 hundredths of the diameter of the moon will be covered by the shadow of the earth.

The annular eclipse of the sun, which will occur on August 20, will not be visible in the United States. Partial phases of the eclipse will occur over all parts of South America, Central America, and the West Indies. The northern limit of the eclipse region will pass through Mexico, cross the Gulf of Mexico, graze the southern tip of Florida, and pass from there in a southeasterly direction over the south Atlantic almost to the coast of South Africa. The southern limit of the eclipse region lies in Antarctica. The path of the annular phase of the eclipse touches the earth at sunrise in the south Pacific, more than a thousand miles off the coast of Peru, passes over Lima in Peru, diagonally across Peru to Boliva, northern Argentina, and Uruguay, to the Atlantic, and continues southeasterly to the Antarctic Ocean, where it leaves the earth at sunset. The width of the annular path is more than 150 miles and the maximum duration of the annular phase will be 6 minutes, 41 seconds, occurring about noon in Bolivia south of La Paz.

On September 22 at 9:24 P.M., Eastern Standard Time, the sun will cross the equator going south and autumn will commence in the northern hemisphere.

Biology in the News

Seeking to bring about a wider appreciation of biology and our daily living, Melvin A. Hintz, biology teacher in the South Milwaukee High School, South Milwaukee, Wisconsin, has worked out a project that is proving most successful. It is interesting to the students and is not difficult to administer. At the start of each semester students are given an instruction sheet that lists points for consideration as a guide to effective reading, covering purpose, method, approved magazines and the writing of the project.

Writing in *The American Biology Teacher*, Mr. Hintz goes on to say that "each student is required to read one newspaper article and one magazine article of a biological nature each week. In order to safeguard the scientific quality of magazine reading material used, the list is limited to the following, which are available in the classroom or school library: *Science News Letter, Science Digest, Nature Magazine, Natural History, Today's Health, Wisconsin Conservation Bulletin,* and *Scientific American*. This limited list does not mean that valuable scientific material is not to be found in other magazines. For example, *National Geographic* has excellent material. *Life* magazine has good material, but this is better suited for stimulating interest by use on bulletin boards, than for the reading program.

"The report is made on a three-by-five card which can be printed or mimeographed.

"On the reverse side of the card the student writes a brief summary of each article read. We urge students to print or type their reports and stress neatness, accuracy and punctuality. The reports are turned in at class time on the date stamped on the report blank and are not accepted after this time except in cases of legitimate absence. Set a time and do not accept late reports if you want the plan to work smoothly.

"A master sheet on which are recorded the points for each week's readings is made for each class. The reports are graded on a *0-33* point basis. Every three weeks the points are added and this constitutes one of the assignment grades for a six-weeks' period. The general code in our school each week includes *33* points if typed, *30* points if in ink, *25* points if in pencil, *15* points if the student has only one article.

"This project, like all projects, may present some particular problems. At first, students will not know how to find good newspaper articles. The teacher can aid much in the development of 'scientific news sense' if he will post on the bulletin board for the students to check some good articles he has clipped. If a check test or oral report is given once in a while, it will discourage students from copying reports from one another. As the teacher checks the reports any evidence of repeated copying will soon be detected.

"One may ask 'what does a project of this type accomplish?' Experience in our school indicates that: 1. It causes students to become aware of the fact that biology plays a very important role in their everyday living; 2. It keeps them informed of the latest developments in the field of biology; 3. It develops keen observation and, above all, aids in forming good habits for later reading. As was mentioned before, the administration of this reading program does not become a time-consumer for the teacher, but encourages the student to intelligently read current newspapers and magazines. Education becomes increasingly valuable in a practical way only in so far as it becomes a part of everyday life."

Lead Shot Substitute

Alarmed at the extent of lead poisoning among waterfowl, the conservation committee of the Federation of New York State Bird Clubs has undertaken a study of ways and means to bring about a substitution for lead shot in shotgun shells. Any suggestions, information or other data bearing upon this subject are sought, and may be sent to H. Everest Clements, 1116 Sibley Tower Building, Rochester 4, New York.

Meet in Washington

Announcement is made by the Wildlife Management Institute that the Eighteenth North American Wildlife Conference will be held in Washington, D.C., March 9 to 11, 1953. Meetings will be at the Statler Hotel. Victor H. Cahalane, chief of the biology branch of the National Park Service, has been named by Dr. Daniel L. Leedy, president of the Wildlife Society, to serve as chairman of the technical sessions' programs.

Plants, Man and Life

Plants, Man and Life. By Edgar Anderson. Boston. 1952. Little, Brown and Company. 245 pages. $4.00.

The author of this interesting and significant book is assistant director of the Missouri Botanical Garden and Professor of Botany at Washington University, St. Louis. He has been a student of the changes that man has wrought in plants and their association with man and his life. This has given him the inspiration for a fascinating text that is most readable by and understandable to the layman.

Lorenz and Animals

King Solomon's Ring. By Konrad Z. Lorenz. With forword by Julian Huxley. New York. 1952. Thomas Y. Crowell Company. 202 pages. $4.00.

There was never a dull moment in the Lorenz' household, for it enjoyed, besides the human occupants, a varied fauna in kind and disposition. Thus the author's relationship to his house guests was most intimate and his understanding of them penetrating and sympathetic. The result is a most entertaining book on the human side of birds and mammals.

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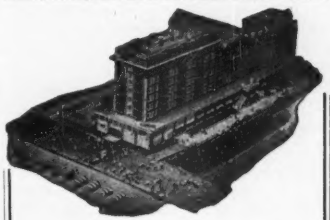

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Bay State Birds

Latest addition to the series of Nature booklets being prepared by Henry H. Collins, Jr., and issued by the Blue Heron Press, Box 236, Bronxville, New York, bears the title "Birds of Massachusetts." This is a sixteen-page booklet designed to introduce one to the more common birds of the Bay State. Color illustrations and and black and white drawings are by Roger Tory Peterson. Copies sell for twenty-five cents each, although mail orders must be for at least one dollar.

Personal Notes

Roger Tory Peterson, noted bird artist, writer and author of *Field Guide to the Birds* was, on June 6, 1952, awarded the degree of Doctor of Science at the 165th Annual Commencement of Franklin and Marshall College at Lancaster, Pa. . .Lyle F. Watts, for the past nine years Chief of the United States Forest Service, completed forty years of a career in the public service with his retirement on June 30. Richard E. McArdle, a government forester for a quarter of a century, and Assistant Chief Forester since 1944, will succeed Mr. Watts . . .Dr. Harrison F. Lewis, Chief of the Canadian Wildlife Service since 1948 and a veteran of 32 years of service in Dominion wildlife administration, has retired from his post. He will devote himself to wildlife management studies on his 70-acre farm in Nova Scotia, and to writing and lecturing. . .Dr. Richard L. Weaver, resource use specialist of the North Carolina Department of Education and president of the National Association of Biology Teachers, joins the staff of the Department of Conservation of the University of Michigan at Ann Arbor in September. . . John D. Coffman retired as chief forester of the National Park Service on May 31. He has been succeeded by Lawrence F. Cook, a member of the Service's staff since 1924, when he started as a ranger in Sequoia National Park.

Bulletins Received

"The Mammals of Elk Island National Park, Alberta, Canada" by J. Dewey Soper; "Limnological Investigations in Cape Breton Highlands National Park, Nova Scotia" by Victor E.F. Solman; "Populations and Movements of the Saskatchewan Timber Wolf in Prince Albert National Park, Saskatchewan" by A. W. F. Banfield. These are three recent bulletins of the Department of Resources and Development, National Parks Branch, Canadian Wildlife Service, Ottawa. . . "Yale Conservation Studies" is an 84-page book published by the Yale Conservation Club as an activity of the graduate students in the Conservation Program at Yale. . ." Combatting Prejudice through Science Teaching" by R. Will Burnett is one of a series of practical teaching aids under the group title of "Science Teaching Today" published by the National Science Teachers Association, 1201 16th Street, N.W., Washington 6, D.C. . . "The Story of the Kiwi" is an interesting illustrated story of this bird, the emblem of the Dominion of New Zealand, published as an advertising booklet by the Kiwi Polish Co. 836 South Swanson St., Philadelphia 47, Pa. . . "Southeast Drainage Basins," "Western Gulf Drainage Basin," and "Southwest-Lower Mississippi Drainage Basins" are three more in the series of co-operative State-Federal reports on Water Pollution published by the Public Health Service, Federal Security Agency, Washington, D.C. . . "Pittman-Robertson Progress Report, 1938-1951," by Warren W. Shapton, published by the Game Division, Michigan Department of Conservation, Lansing, Michigan. . . "Forest Yield Taxes" by Ralph W. Marquis, Circular No. 899, U.S. Department of Agriculture. Twenty cents from Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C.

New Ideas

Dow Chemical Company announces a new miticide called Ovotran Wettable designed to control rapidly multiplying tiny pests destructive to plant foliage. Tests have indicated that it has low toxicity to warm-blooded animals and to parasites of predators of crop pests, as well as to insect pollenizers important to crop production. It is not hazardous to the user. . .From Amsco Company, Le Center, Minnesota, comes something we have long been looking for — an arrangement to keep us from banging fingers when hammering nails. It is called "Third Hand" and is a gadget that wraps around the hammer head in such away that a nail can be clipped into it, started with the side of the hammer and finished in the normal manner. It costs fifty cents and should save many a temper.

Plant Forms in Design

Throughout the summer the New York Botanical Garden is presenting an exhibition reflecting the influence of plant forms on design of fabrics, wallpaper, glass and objects of art. This has been made possible through the cooperation of six museums — The Cloisters, the Metropolitan Museum of Art, American Museum of Natural History, Brooklyn Museum, Museum of the City of New York and Museum of Modern Art.

Disease in Big Game

Outbreaks of hoof-and-mouth disease among Canadian cattle has brought about certain bans on the transportation of cloven-hooved wild animals into the United States, according to announcement by the U.S. Fish and Wildlife Service. Moose, deer, elk, caribou, mountain goat, mountain sheep and antelope are affected and gunners may not bring animals across the border so long as the disease persists.

Science Booklist

As a cooperative approach to a major library need, the New Jersey Library Association, 34 Commerce Street, Newark 2, New Jersey, has published a booklist for the general reader entitled "Meet the Sciences." It covers fifty current titles in the field of science, these being carefully selected with the aid of science experts for their readability as well as authoritative treatment. Full details may be obtained from Marian C. Manley at the address given.

New Binocular

Claimed practically to double the field of view possible with any other pocket-size binocular, the Bushnell "Broadfield" is announced by Bushnell Optical Corporation, 20 Bushnell Building, Pasadena 1, California. The glasses have been developed following a careful analysis of a questionnaire that sought to discover what outdoor people most desired in a binocular. It has full 6 power magnification. The company offers to send full details and a booklet entitled "How to Select Binoculars."

Bean's Fortieth

In Freeport, Maine, eighteen miles east, of Portland, is the factory of L.L. Bean, manufacturers of outdoor equipment of all sorts for those who go into the outdoors for a variety of reasons. It is a Yankee family-firm that is this year celebrating the fortieth anniversary of a business built on the sound basis of satisfied customers. The Beans are outdoor people themselves and a great deal of their own know-how in the open has gone into their products. The region of Freeport is a gateway to country frequented by outdoor people, and the factory salesroom of the Bean plant is open around the clock so that any vacationer who needs an item of equipment may buy it, day or night.

Past Glories

Dead Cities and Forgotten Tribes. By Gordon Cooper. New York. 1952. Philosophical Library. 160 pages. illustrated. $4.75.

Information on peoples and communities of past glories are always fascinating, the more so when some of these offer enigmas and pose questions as to why these glories passed. In this interesting book the author presents chapters dealing with such widely placed dead cities as Anuradhapura in Ceylon, Chichen Itza in Mexico, Hadramaut Valley in Arabia, Ak-Kapana in Boliva, and others.

General Biology

General Biology. By Perry D. Strausbaug and Bernal R. Weimer. New York. 1952. John Wiley and Sons. 813 pages. Illustrated. $6.00.

This is a new, revised and partly rewritten edition of this excellent text that was first published in 1938. In this new edition more emphasis is placed on the scientific method, and other information is brought up to date in the light of new knowledge. New illustrations have been added, also.

THE READER'S MARKET

A place where members of the American Nature Association and readers of Nature Magazine may find many interesting offerings or may advertise themselves, at low cost, for things wanted; things they have for Sale, for Trade, for Sale or Trade. This is an excellent forum for acquiring or disposing of such items as binoculars, books, cameras and photographic equipment, magazines, sports and outdoor equipment, etc.

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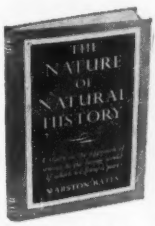

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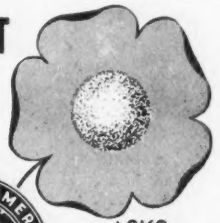

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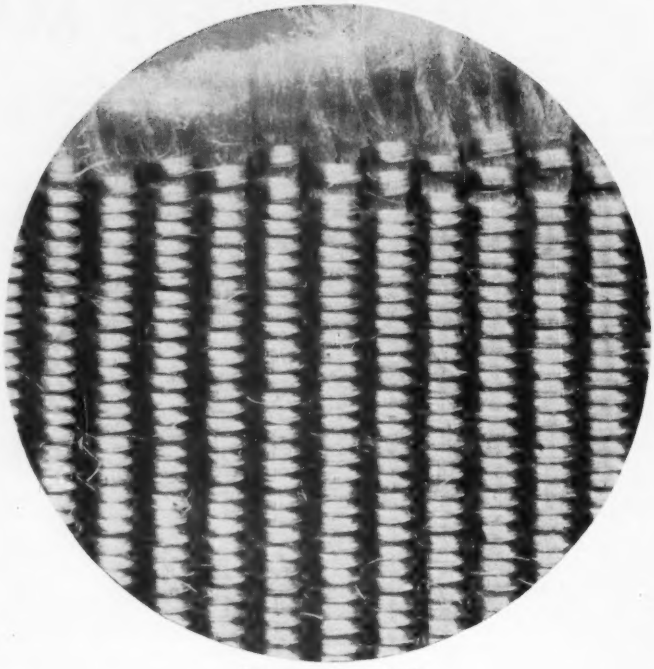
UNDER THE MICROSCOPE

By JULIAN D. CORRINGTON

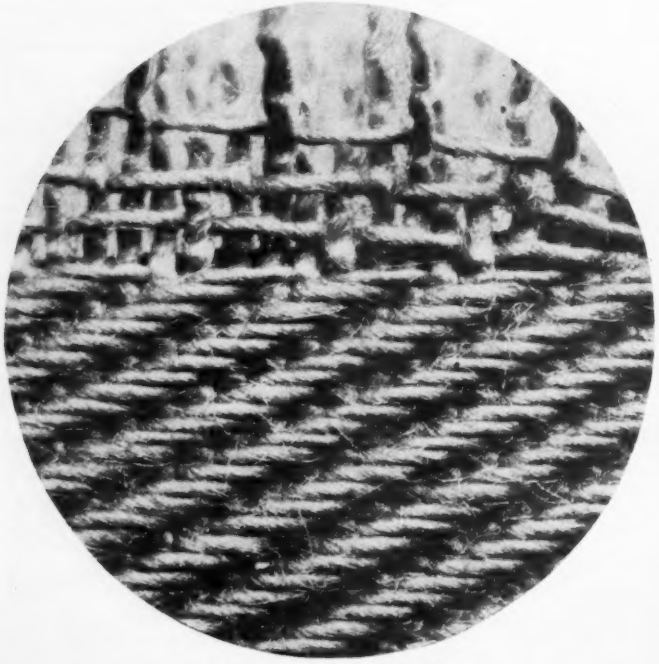
VARIATIONS ON A THEME

THE illustrations on these pages are examples of the ingenuity of man in achieving variety, and what better medium for the spice of life than clothing? Endless variation is possible since, in the textile world, the manufacturer can diversify fibers, weave, mixtures, sizes, color, pattern, and other factors. The first of our recent series on textiles was entitled *Warp and Weft*, and appeared in the May, 1951, number, followed by *Unwoven Fabrics* in the February, 1952, issue. With the first of these was shown an illustration of *plain cloth*, the basic design for the variations herewith described. Plain cloth is simply fabric made with plain or regular weave, where the series of parallel longitudinal threads (warps) are traversed at right angles by the series of parallel horizontal threads (wefts or woofs) so that each weft passes first under then over the warps in regular alternation, the two series being equal in number, size, spacing, and material. This is the primordial pattern for weaving, more ancient than the alphabet. If done by hand, the fabric is *homespun*, if of cotton and turned out by the power looms of mills, it is *factory*. But even in the earlier phases of civilization, those of an inventive turn tried innovations, and today it is the moods and tenses that intrigue both the manufacturer and the customer.



Rayon rep fabric, 10X

One variation that occurred to some weaver of long ago was that of using different thicknesses of threads or fibers. If a thick and a thin warp or weft are alternated in the weaving, a corded effect termed *rep* or *repp* is produced. For example, as seen in the accompanying illustration, threads of uniform thickness pass alternately over and under threads of quite unlike diameter. Note that the uniform threads cross over a large bundle of fine fibers, then under a bundle so small as to be unseen from the front surface, resulting in a series of parallel cords that seem to have nothing to connect one to another. Corded goods wear well and give a smart appearance.



Cotton gabardine twill, 10X

Diagonal cords or ribs are produced by skipping threads according to a predetermined plan, as passing the wefts under one then over two warps, or under three then over one. In the illustration of cotton gabardine, observe that the horizontal threads pass under one then over three warps, resulting in a diagonal pattern. This device is *twilling* and the cloth is *twill*, a word derived from the German *twillen*, to make double, similar to *twice*, as the first goods made in this manner skipped two warps. If three are passed the result is *drill* or *drilling*, from German *drillich*, derived from Latin *trilix* and this in turn from *tres*, three, plus *licium*, a thread of the warp. Drill is, however, now restricted to indicate a heavy linen or cotton fabric made in this fashion.

The term *diaper*, so familiar to all households endowed with a baby, primarily

Cotton bird's-eye cloth, 12X

indicates a textile pattern made up of the continual repetition of one or more unit ideas in the design. These connect with or grow out of one another or their outlines blend. The bird's-eye diaper shown in an illustration employs the twill principle with threads exhibiting certain differences, such as color. In later installments we shall describe still other variations on the theme of plain weave. A microscope slide collection of these is interesting to observe, draw, project, or photograph.

PHYSICIANS AS BIOLOGISTS

BEFORE the days of schools of business administration, one of the favorite courses pursued in college by those who later became business men was engineering, and another was law. And just as there have ever been engineers and lawyers who, after graduation, have not practiced their profession, so there have been at all times and in many countries physicians who have not become professional healers of the sick.

The graduate M.D. today, after interning and often taking a residency, to a total number of years of education and training as high as twenty-four — or a third of a lifetime — is at last ready to begin practice, and the majority proceed to do so. But there are always those who are attracted by the scientific, artistic, literary, or other side of medicine and choose a different career. The pathologist, referred to as the doctor's doctor, is one of these. He is concerned with disease rather than with the patient, and advises other physicians in diagnosis, performs autopsies, and examines organs to determine the cause of death. Life insurance, hospital administration, medical illustration, editorial work, and even such completely non-professional lines as politics absorb a certain percentage of graduates. Practicing physicians may turn to teaching in a medical school or may specialize in public health. Many of these may come to be employed in a State where they have never taken out a license to practice medicine, and cannot legally do so.

But those we wish primarily to signalize here are the select group who make research their life work, studying problems that begin as medical but become purely biological or chemical investigations. Formerly research was an individual matter; today it is apt to be conducted by teams, working cooperatively. One of the most celebrated examples was the team of Banting, Best, Collip, and McLeod (June-July issue) who prepared insulin for the treatment of diabetes.

When is a physician a scientist? Many replies to this question would doubtless express surprise that such a query could be asked: Are not *all* physicians scientists? Is not medicine a science? Well, to be sure, there is the phrase "the healing *art*." You can frame definitions to fit preconceived ideas, but in the general meaning and usage of the words today, we must state that the physician *per se* is not a scientist, any more than is the engineer, although both have majored in science in their studies. They are technologists,

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practicing an applied science.

Strictly speaking, even the term "applied science" is wrong; it should be "applied sciences." There is no science of engineering, for example. The chief sciences involved are physics, chemistry, and geology; the principal art is logic — that is to say, mathematics; while the craft is the application of these fundamental subjects to construction, as a bridge or a building. So, there is no science of medicine, but instead there are fields of specialization in biology, chemistry, and physics. When the medical school student enters the clinical years and ceases to study physiology or biochemistry or bacteriology as such, he ceases to be a scientist. In medical practice there is both technology (as in using antibiotics) and art (experience), the latter requiring and using much background information departmentalized as sociology, psychology, human relations, and economics.

A graduate M.D. may prefer to go back to pure science in choosing his further career, but if he does he ceases to be a physician and becomes a bacteriologist, anatomist, organic chemist, physiologist, or whatever, and is on the same footing with the Ph.D. in the same field. The latter has the wider experience with the whole area of knowledge, while the M.D. has the advantage if the information is to be applied to man. Both are *doctors*.

Today, if you hear a person addressed as "doctor," he may be a veterinary (D.V.M.); dentist — more correctly doctor of dental surgery (D.D.S.); osteopathic physician and surgeon (D.O.M.); Allopathic or homeopathic physician and/or surgeon (M.D.); a college teacher (Ph.D. and many others), or someone who has been awarded an honorary degree for distinguished service (LL.D. and many others). Industry claims many Ph.D.'s also. While all physicians are doctors, since they must have received a doctoral degree from a recognized college or university, only a small proportion of the doctors of the world are physicians, and it is unfortunate that the public has so confused the distinction. The original meaning of the word is *teacher*, from *docere*, to teach.

The ignorant have further complicated matters by referring to any corner druggist who passes out a bit of free medical advice along with his pills as "doctor," and the word has been altogether debased by implying, through false titles, that a tree "doctor" is on an educational par with a "horse doctor," the latter being an opprobrious monicker for a Doctor of Veterinary Medicine, the former having usually no degree at all.

Formerly the physician's degree was Doctor of Physik, or even Doctor of Philosophy, these subjects embracing broader or different fields than now. Another old term for the physician was *leech*, and the impression seems to be rather general that the practitioner was slangily so-called because of his one-time excessive use of leeches in blood-letting. As a matter of fact, the reverse is true. Just as the original meaning of doctor was teacher, so the original meaning of leech was a physician, and the animal received its name because of its use by the profession; the worm substituted for the doctor, as it were, and so became the doctor during the withdrawal of blood.

In listing some famous biologists who received a medical training or were physicians by profession, one of the first is Galen, the "greatest physician of antiquity." He lived in Rome, in the Second Century A.D., and was renowned as physician to gladiators, soldiers, and the emperor, and as lecturer and anatomist. Today, however, he is even more celebrated as the founder of the experimental method in science; his researches in physiology embraced experiments with many organs, notably the nervous system.

Andreas Vesalius, the fiery little Belgian, completely revolutionized human anatomy and the methods of presenting it at the University of Padua, Italy, and in 1543 published the first modern book on the subject, a work credited with the overthrow of reliance upon authority and with bringing on the Renaissance in Science. A physician by training, his fame is that of a teacher and writer.

In England in 1628 Dr. William Harvey, personal physician to the king and, like Vesalius, a graduate of Padua, published his celebrated treatise on the motion of the heart and blood, which established the fact of circulation, an accomplishment that today far outweighs any of his acts as a doctor of medicine. His work with embryology, mainly of the chick, was also outstanding. Malpighi, the Italian microscopist, in the middle of the Seventeenth Century, wrote the world's first monographs — treatises on single subjects — and these were published by the then new *Royal Society of London*, to which Malpighi was elected a foreign or corresponding member. These monographic writings — we would call them articles or papers — on the anatomy of the silkworm, the anatomy of plants, and chick embryos, made him world famous and set the tone for all future research and the style for all future scientific writing. When you turn out a thesis or a professional article to submit to a journal you are following the trail blazed by Malpighi.

There was the great Linnaeus, who consulted patients not one day longer than was necessary before becoming the foremost botanist of the Eighteenth Century, the founder of taxonomy or classification (system of binomial nomenclature; classification scheme), and one of the ten greatest men in the history of biology by anyone's account. There was Albrecht von Haller, "that abyss of learning," a universal genius who wrote an eight-volume treatise on physiology that is generally acclaimed as the modern starting point for that division of the biological family of sciences. Haller was noted for his extensive and encyclopaedic knowledge of practically all subjects, for his work in botany and anatomy, in language and literature, and as a teacher and writer, far in excess of his medical practice. There was Kaspar Wolff who, as a young man of 23, wrote a dissertation on the embryology of the chick, still considered as the world's finest doctoral thesis; Johannes Muller, great anatomist, physiologist and, above all, teacher; Sir Richard Owen, who clashed with Darwin and was renowned as a paleontologist; Rudolph Virchow, who struck the keynote of modern medicine with his emphasis on the importance of cellular biology, known to all high school students of the life sciences for his celebrated dictum, "every cell from a cell," sweeping the old spontaneous generation idea into oblivion; and August Weismann, whose transcendental doctrine of the immortality of the germ plasm wrought vast philosophical changes in man's approach to the nature of life. These were physicians who became great biologists.

There was a time when it was perfectly in order for the physician to invade fields other than his own, but woe betide the layman who tried to butt his way into the medical profession. The well-known case of the layman, Pasteur, greatest of all names in the history of medicine, comes immediately to mind. It is necessary, of course, for the profession to guard its ranks with a jealous eye, else there would be countless impositions by fake cults and by quacks and crackpots of every variety, yet the record in the past has often shown the entrenched body of physicians too reactionary for their own good or for that of society. Today, important discoveries are as apt to arrive from university laboratory or pharmaceutical house as from the hospital, and commonly are achieved by mixed teams of M.D.'s and Ph.D.'s working harmoniously and without thought of professional prerogatives or rivalries.

Years ago, teachers in medical schools were customarily physicians, mostly on a part-time basis. A busy M.D. would so arrange his schedule of calls and office hours as to include a period of instructing. Sometimes this worked satisfactorily, but often the teaching was unprofessional; there is nothing in the training of a physician that qualifies him as a teacher. Accordingly, today the instructors for the preclinical years, in courses such as anatomy, biochemistry, bacteriology, and others are more likely to be Ph.D.'s than M.D.'s, a change in policy that secures better instruction and breaks down old barriers. A select few have found their interests and life programs best served by taking *both* of these advanced degrees, the M.D. technological, practical, developing certain skills; the Ph.D. theoretical research, requiring broader study and the writing of an original dissertation, and generally developing other skills. The advantage of both disciplines in a single investigator or in a research team is plain.

First Lieutenant Henry A. Commiskey, USMO Medal of Honor

On September 30, our Yank-dough-boy, Roger, Lieutenant Commiskey's platoon was assaulting a hill position called Hill 80. Suddenly it was held up by fire from a machine gun. The important attack stopped cold. Alone, and armed with only a .45 caliber pistol, Lieutenant Commiskey jumped to his feet, rushed the gun, dispatched its five-man crew, then reloaded and cleaned out another foxhole. Inspired by his daring, his platoon pressed and captured the hill.

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